JEAN A. S. RITCHIE

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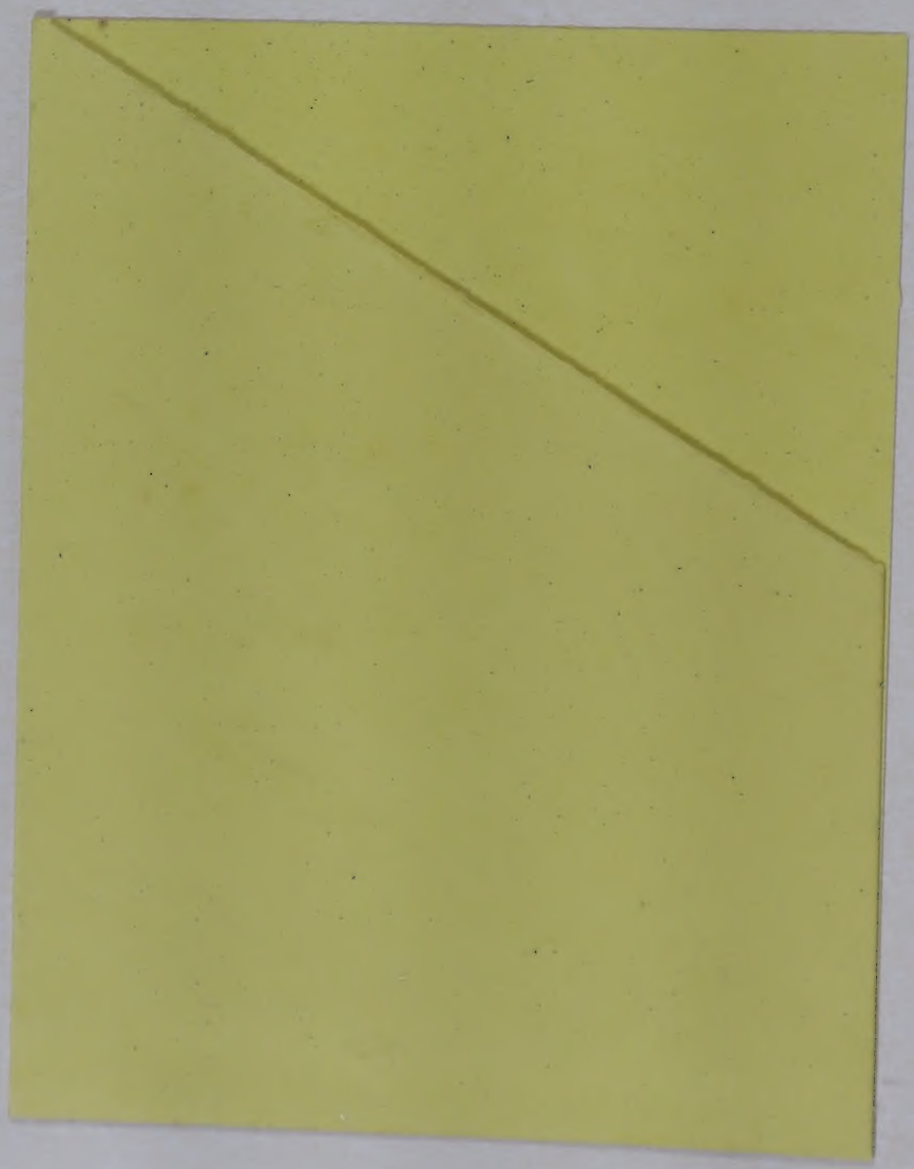

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The paperback edition of this book is available at a reduced price. This has been made possible by a generous subsidy provided by the Swedish International Development Authority (SIDA). The publishers and the author would like to acknowledge the valuable role of SIDA in this respect.

Nutrition and Families

Jean A.S. Ritchie

Illustrations by Jill Last

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Published with the support of the Swedish International Development Authority

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This book was distributed in a provisional form under the title a *Manual on Child Development, Family Life and Nutrition*, by the United Nations Economic Commission for Africa and the Food and Agriculture Organization of the United Nations, 1978.

First published in this revised edition in 1983 by
MACMILLAN EDUCATION LTD
London and Basingstoke
Companies and representatives throughout the world

ISBN 0 333 35766 3 hardcover
0 333 35767 1 paperback

Filmsetting by Vantage Photosetting Co. Ltd.,
Eastleigh and London
Printed in Hong Kong

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PREFACE

This book which in its first edition was called a *Manual on Child Development, Family Life and Nutrition* was first produced in 1978 by the African Training and Research Centre for Women (ATRCW), of the UN Economic Commission for Africa, with assistance from the Food and Agriculture Organization of the United Nations. It was published in limited editions by UNECA, Addis Ababa. It has been issued also in French and Portuguese and adapted for use in Latin America. Because the demand for the Manual has exceeded the resources of UNECA and the FAO, this revised edition is published by The Macmillan Press Ltd as a contribution to the Teaching Aids at Low Cost (TALC) programme promoted by the Institute of Child Health, London. The Manual was written in response to requests from participants at UNECA workshops. Its purpose is to provide a practical tool for training and use by intermediate level workers (Diploma and Certificate post-high school education) in home economics, agricultural extension, education, community development and health, whose work is concerned with helping rural families in Africa.

Workshop participants stressed that what they need is material written particularly for Africa and dealing with African problems; and having a practical rather than a theoretical approach.

Evaluation of field programmes in Africa has shown that many workers have difficulty in converting what they have learned in college into simple advice to families. To help with this, suggestions on simple points which could be discussed with families have been included at the end of each topic. To try to meet the need for a practical approach, a few ideas for learning experiences which could be used in staff training courses and workshops have been presented in Chapter 7.

Because of the shortage of reference books and of technical libraries in many places, the data given in Appendices 1 and 2 have been included.

ACKNOWLEDGEMENTS

I acknowledge with thanks the expert assistance of Dr Jean DeLaney, FAO, in the preparation of Chapter 2 of the book, on child development, and the talent and co-operation of Jill Last who worked closely with me to produce the charming and informative illustrations. I should also like to thank the staff and participants of the twenty-three national workshops in African countries whose lively discussions helped to emphasise the need for such a book, to define its scope, and to contribute to its content.

I express my gratitude to all those who have sent comments and suggestions for improving the original UN test version.

Finally I thank Mrs Ann Burgess and Professor David Morley, two of the authors of *Nutrition for Developing Countries*, the former for collecting and sending me comments from FAO nutritionists, the latter for encouraging me to revise the book as part of the Teaching Aids at Low Cost (TALC) programme, and for bringing the publishers and me together.

Jean A. S. Ritchie

1 INTRODUCTION

This manual for trainers and field workers deals with normal growth and development of the young child and with some of the conditions which influence whether or not children will grow into healthy, strong, alert and balanced adults. People are the basis of every society, and good physical, emotional and intellectual development of these people, rather than an increase in national wealth, is now widely accepted as the target for the true social and economic advance of communities and nations.

Successful progress from childhood to adulthood depends to a large extent on whether families and communities can provide children with good nutrition and a healthy environment, and with the necessary care, encouragement and education to allow full and normal growth of body, mind and emotions. The close relationship which mothers form with their babies and young children is of great value in early life, when important steps in children's growth occur. In Africa during the early years when children are on the breast, they rarely leave their mothers and close ties exist. After babies are weaned, however, they are usually quickly replaced by younger brothers or sisters and it is difficult for mothers to devote the time, energy and resources needed for the best development of the weaned children.

Many factors in African life, in rural areas and in the shanty towns within cities, block the satisfactory growth and development of children. Poverty, ignorance of children's food and health needs, and inadequate health and social services are barriers; so are the roles given to women in many African societies which result in their overwork and ill health. Constant child bearing, with little time between pregnancies, has dangerous effects on the health of mothers and children. This is demonstrated by low weights of babies at birth, slower physical and mental growth, frequent illnesses and deaths in infants.

Much could be done to improve human development in Africa through more formal and informal family life education programmes for men and women and boys and girls, in which less importance is given to women learning embroidery and the cooking of Western foods and more to parents learning together how to solve the family problems which they face in daily life. This means educational programmes which emphasize growing more food; the nutrition of the family, especially the feeding, weaning and care of young children; environmental and personal sanitation and health care; money-earning skills; literacy; better home and farm management practices; and population/family life education.

This manual tries to assemble, in a simple way, some of the knowledge which can contribute to better family living. It makes no attempt to touch on all the fields mentioned above but limits itself to discussing the following: how children grow and develop and the ways and stages of such development in the young child; the problems of balancing population and family size with national and family resources; to help people – and especially children – to lead healthy and satisfactory lives; nutrition and the prevention of infections on which much of a child's ability to grow physically, and to some extent emotionally, socially and mentally, depends.

This manual is not aimed at any one particular field service because workers in all services trying to help rural families need to know something about child development, family life and nutrition, and how to work together. It takes a team effort to solve the problems of poverty, shortage of food, poor crop yields, poor hygiene, too short birth intervals, and lack of child care and management skills. It is hoped that this manual will prove useful to the field staff of all services who carry the responsibility of actually giving practical help and advice to village people.

2 CHILD DEVELOPMENT AND GROWTH[1]

If we are to be able to help families to achieve proper growth and development for their children, we must understand how children normally grow and develop when they have the advantages of a healthy environment, good nutrition, and plenty of care and attention; and we must study the social, economic and environmental influences in a given area which affect child welfare.

2.1 Children in the family and in society

In every society or country in Africa the family unit is a most important social group. The family is responsible for meeting the needs of its members for care, food, and feelings of belonging and love. The family is also responsible for raising the young into mature adults. Children are brought up by parents within their own particular culture, where the common customs, beliefs, and attitudes influence how parents treat children and how parents react to a child's behaviour. These customs, beliefs and attitudes also give rise to the expectations and hopes parents have for their children and their future.

Parents and other members of the family living together are the first and basic influence on children and the first source for meeting their needs. Children's needs for love and for feeling safe and wanted, as well as their basic physical needs for food and shelter, are satisfied by the family. The more preparation parents have for this task, the more they can assist the growth of their children into healthy and mature adults.

Each child in the family is unique and different, just as adults are different. Children require different amounts of care and attention as they grow, and parents need to recognize and respect these differences; they should not expect each child to behave the same, or treat each child in just the same way. There are differences in the patterns of growth and development of individual children. There are, however, certain basic steps in the process by which children grow and develop which are very similar for every child. When parents and other adults know and under-

Love and attention help young children to develop well

[1] The assistance of Dr Jean DeLaney, of FAO, in the preparation of this chapter of the manual is gratefully acknowledged.

Fathers can also help their children to develop well

stand these basic steps, they are better able to meet the needs of their children, and better able to recognize critical and important periods in a child's life when certain needs are particularly important for the later welfare of the child. Mothers nursing infants in order to be sure that they are fed well is an example of acknowledging and meeting one such special need.

When parents know the stages to be expected in the development of normal children they are able to recognize when a child is growing very slowly and may require medical help or other special care.

Close attention to the way a child is growing is very important in the first months after birth. This is a time of fast growth and the infant who misses the good nutrition from his mother's breast milk, or lives in very unsanitary conditions, or who misses regular check-ups at the dispensary or clinic, may suffer harm which prevents good physical and mental development later in life.

The period immediately after a child is weaned is also a critical one in African countries as this can be a period when the mother is preoccupied with a new pregnancy and has limited time or energy to devote to the weaned toddler. The, often, sudden separation of the child from constant close contact with the mother, on her back and in her bed, may be a shocking experience which affects appetite and growth.

The young child must take the first steps towards learning the important skills of walking, talking and interacting with others. If in early life

The time parents spend with a child is important

children get attention and help in learning from parents, and are encouraged to be adventurous and to try out new activities, then development is apt to go on at a faster and healthier pace. The children need parents, adults and other children who spend time with them in play and in helping them to acquire and practise the basic skills. The time parents spend with children, helping them to understand and to learn from things and people around them, is very important. When children are spaced two or more years apart, and when the number of children in the family is not large, parents have more time for each child.

In the early months and years, the child needs objects which are interesting to see, touch, move and learn from. Many things from the home, farm and village can be exciting playthings, and can also help a child to learn. The young child who spends long periods alone, with no one to play with and no objects to experiment with, will not grow as well or as fast as the child who has much love and attention from parents and family, who plays with others, and who has many things to handle and observe.

2.2 The way young children grow

Changes in the behaviour and actions of a child result from body growth, that is, physical development; from growth in ability to learn, understand and adapt to the environment, that is, mental development; and from growth in maturity of feelings and interaction with other people, that is, social–emotional development. In the behaviour of daily life these areas of growth are integrated or combined together into what could be called the 'whole child'. We react to the total presence of a child – not body size or feelings alone.

For the purposes of understanding child growth and care we may study these three areas separately while realizing that they make up the broad areas of human development and that they are closely related and affect each other.

Physical growth

The change in body size is what we notice first in child growth. A child adds almost 30 cm (12 inches) in length, and about 8 kg (17–18 lbs) or more in weight during the first two years or so. Changes in size and shape are influenced (a) by heredity, which also influences looks and possibilities of growth; and (b) by environmental factors such as the quantity and quality of food and health care received. With physical growth the child moves from simple bodily movements and actions to more difficult or complex ones. For example, children first crawl, then walk and finally run, hop and skip. With practice, physical skills can be improved, and children's eagerness to practise and perfect new skills shows how strong the desire to grow is.

Children need help in learning

Children learn from the things around them, for example the concepts of hot and cold

Physical growth, as shown by weight and other body measures (see pp. 28–37) follows a path which can be checked by regular weighings so that parents can always know if a child is following the 'road to good health'.

Good physical growth can be promoted in several ways: by parents and the family helping children learn and practise physical movements; by breast-feeding and good food supplements for the infant and young child and by a good diet for children of all ages; by the prevention of infections; and through children's play and exercise with the family and with other children.

Mental development

Mental growth or development comes about with time and through learning new skills and meanings. Rewards for children such as the love, attention and praise they receive from parents and the help they are given in trying out new things, are important for early learning. This help from parents encourages a child to practise skills partially learned, such as talking, and to use the skills at a more difficult level, as in talking in whole sentences or expressing thoughts. Experience built up as age increases is a major factor in determining a child's level of maturity and readiness to understand and to learn new intellectual skills and more complex meanings.

Children learn from the people around them, by being close to them and seeing and talking with them, as well as from the objects or things from home and farm which they can use for play. New colours, shapes, noises and tastes which they experience help them to learn. The parents and family can help by talking to them, repeating new words or ideas many times, by helping them in problem-solving situations, by singing with them, and by telling stories and tales as they get older. Children need to see and understand that their parents *want* them to learn. Children make mistakes when trying something new, or when using new words, but good parents realize that this is part of learning and growing and do not punish them for every little mistake. Rather, they praise the child for trying to learn and grow. Children learn best when parents show their approval and encouragement.

Play and playthings, however simple, are important for a child

We have said that children learn from the people and things around them. For example, when a young child crawls too near the fire or stove he feels heat, hears the warning voice of his mother or father about 'hot', and begins the first simple understanding of the word or concept 'hot' as being different from 'cold'. From these simple beginnings children learn to organize and give meaning to the people, events, and things or objects in their daily life.

Play and playthings, however simple, are very important for children's learning. At first, children respond to parents' play with words or songs or to being held or lifted or bounced on the knees. Then they begin to play

alone, with the objects they can use as toys. Bottle caps on a string, or cars made from old match boxes, or doll figures from stuffed cloth can all help a young child to play and learn. As they grow, children need others to play with – brothers and sisters, or neighbours' children, or groups of children if a day-care centre is available to the family.

Chapter 7, 'Learning Experiences', gives ideas for materials which can be used for making simple toys.

As the child grows older pictures and picture books are good learning toys. Children also enjoy and learn from stories told by parents and family members – perhaps about their own childhood, or about events in the history of the village, or about children in other countries.

When children reach the right age, the lower grades of primary school provide an additional environment for them to continue the learning that was encouraged by parents and the home. Good teachers support the child in learning new skills of writing and reading and other abstract concepts which are important for full mental growth and development. The parents who teach their young children by giving them time and attention, by encouraging play, and by providing toys and objects which help this play, are preparing them for school and for learning later in life.

Picture books are good learning aids

Social–emotional development

The behaviour of a child takes place with other people; the crying, laughing, smile and first words of a young child are in *response* or *reaction* to others. The feelings and emotions that children have about themselves, and about other people, develop and mature in a similar way to other areas of growth. Young infants only cry to express their need for food or attention, but the 2- or 3-year-old child has many different feelings to express, such as happiness, anger, sadness and shyness. Social and emotional growth takes place through the experiences a child has with others. If parents help children to feel proud and happy about themselves, children are likely to show this in their behaviour and will treat others in a happy way. Happy and proud children are the result of parents who give them time and attention; who encourage them to talk and share thoughts and feelings – even anger – because this is how children learn to control and use emotions; and who understand that a young child does not yet have control of feelings and may change emotions quickly, especially when tired or sick. Punishment for feelings that the parent does not approve of may only increase their intensity.

Children differ in their individual feelings and how they show them. Age makes a difference to what feelings are shown or expressed, and to how these feelings are expressed to others. Boys and girls may differ a little in feelings and emotions but many times this is the result of what they are taught, for the basic feelings and emotions of boys and girls are much the same. It is important that both parents help in raising children; girls learn from fathers, and boys from mothers, in important ways.

2.3 Behaviour

Desire for attention may cause a child to be noisy or daring

Behaviour is *caused*; it is not the result of chance. Children have reasons for their behaviour and actions. As we study the steps of growth and development it is possible to identify the basic causes of behaviour.

- Some behaviour is caused by the stage or level of the child's growth. The young infant cries often, for example, because that is the only way he or she can get attention, and some crying is normal for an infant. Parents need to understand and have judgement about how much crying by the infant is expected and normal, and when it may indicate a sickness.
- At each stage of growth, certain behaviour is expected. Parents need to learn what is normal behaviour at particular ages, and what behaviour or actions may show a sick child who should be checked by a doctor or nurse.
- Children usually act to satisfy some need or wish. Being hungry can cause a child to cry or to become quiet and withdrawn; while wanting attention from parents and others may cause a child to be noisy and active or daring. Parents need to consider, when observing or reacting to behaviour of children, what need or desire may be causing this action or behaviour.
- Some behaviour of children is caused by frustration because of the blocking of a wish or need. A child who is told to stay close to the house may want to explore other areas and may become noisy and cry if not allowed the additional freedom. This does not mean that children should always be allowed to do as they wish, but parents need to consider why the child may feel blocked or frustrated and what other choices there are.

The experiences which children have, what they learn in the family and in the community, also lead to certain behaviour. Children in the city may behave and act somewhat differently from children in rural areas because of what they see and experience in the different situations. Children in Africa may behave differently from children in India or Brazil because of what they experience, their surroundings, the beliefs of their parents and other reasons of culture and situation. As parents learn about child care, they can identify the beliefs and customs of their own community which influence how they themselves care for their children, and what the results will be for the child.

To help parents the following summary of steps and stages in development may be discussed with them by the field worker, to see if these are the same in their community, and how closely the picture fits their own children.

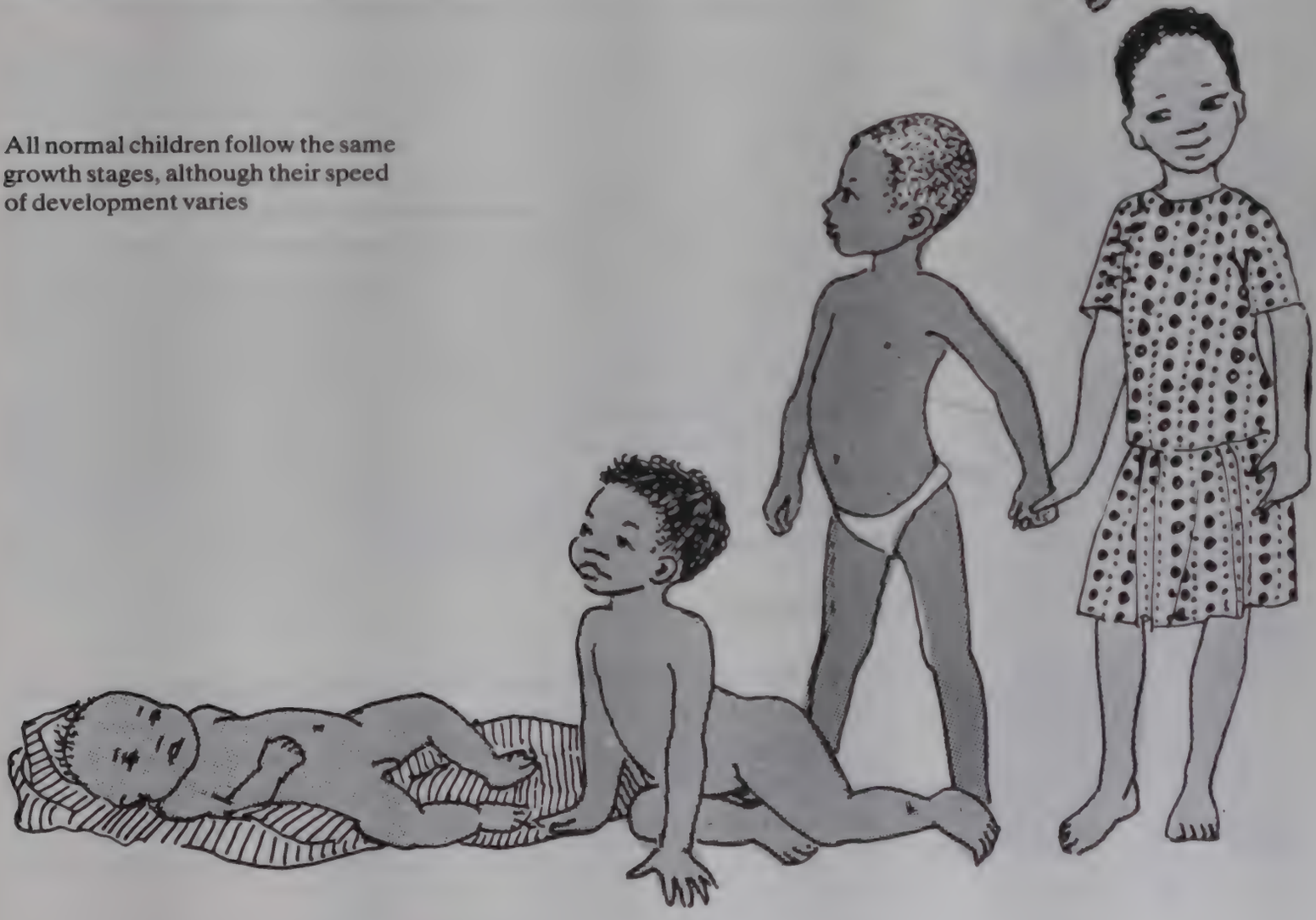
2.4 Stages in child development

Physical, mental and social–emotional growth are, as we have said, very closely interrelated. Poor physical growth, for example may influence speed of learning and emotional and social development. Thus the stages of growth discussed in the following pages include all three kinds of growth and show the development of the child as a whole person. All normal children follow the same growth stages although their speed in development varies according to heredity and environment. The ages at the different stages given here are fairly typical for advantaged children but individual children may vary widely and still be quite normal. Each child develops in his own unique way, following his own timetable. The stages given are *not* to be used to judge individual children. They will help us to understand children, not to measure them.

Some behaviour is caused by frustration

Infancy: birth to 2 years

The young infant seeks safety and security. As people respond to his/her needs by feeding him, loving him, making him clean and comfortable, helping him to learn and do things for himself, he develops confidence in his world and in the people around him.



All normal children follow the same growth stages, although their speed of development varies

Between birth and 3 months

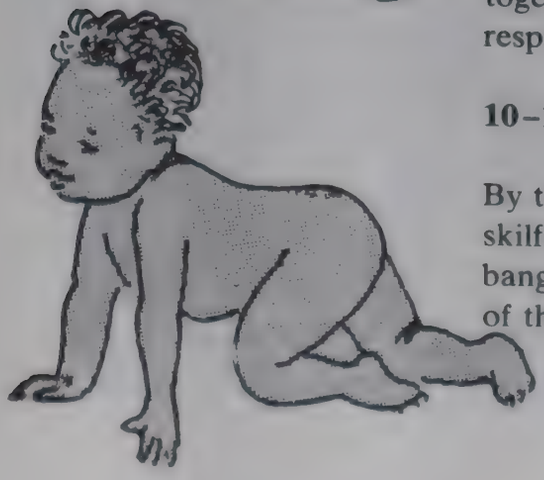
The infant's muscles grow and strengthen so that he can hold his head up when he is put in a sitting position and can tighten his muscles when picked up. He can hold his eyes in a fixed though vague position and he can hold light objects in his hand but probably does not pick them up. He begins to notice a human face and may begin to smile.

4–6 months

The infant smiles when he sees a person and likes to have people pay attention to him and talk to him; he chuckles, coos and laughs and becomes very sociable. By 6 months he is very vocal, using his voice and making meaningless sounds. He recognizes his mother and knows which people are familiar and which are strangers. His body strengthens and he has much more command over it. He is delighted with his ability to move his head, to play with his hands, to put things in his mouth, to roll over and rest on his elbows and even perhaps to sit up for a second or two.

7–9 months

He fingers and manipulates objects and his own hands and wrists, bangs on things and puts them in his mouth. Physically his coordination skills increase and he uses his thumbs with his fingers more easily and uses both hands. Reaching and grasping are now automatic and he may feed himself with a biscuit or piece of bread. He can sit alone and may even crawl or stand. He may begin to get teeth at 6–8 months. Socially he learns to respond to more than one person at a time, he likes rhythm and being bounced about but he can easily become over-excited. He enjoys singing to himself, and making other noises with his voice and banging toys together, and he can be self-contained as well as sociable. He begins to respond to his name and to imitate sounds.



10–12 months

By this time the infant can usually roll over and sit up, uses both hands skilfully to feel, pluck, investigate, to put things inside one another; to bang with cup and spoon, to dip into food and to carry things. By the end of the first year he may have six front teeth. He may start to walk or to

creep about very actively. He may say the words in his language for mama and dada and perhaps one or two other words.

Socially he is developing. He enjoys peek-a-boo (hiding behind the hands) and patting games with the hands and he is showing interest in his play although he is easily distracted. He may begin to be coy. He notices disapproval or praise in his mother's tone of voice and is socially very cooperative although his behaviour is frequently variable and inconsistent.

12–18 months

By one year an infant's birth weight has usually tripled. He learns to walk. He enjoys pulling, pushing, lifting, pouring, throwing things, playing and splashing in water. He often tries to feed himself and can hold a cup. He may speak a few words correctly. Socially he is full of curiosity and 'into everything'. He enjoys watching and imitating people, by coughing or sneezing for example. He is more responsive to adults than to other children and is very dependent on his mother. He may show emotions such as affection, anxiety, jealousy, sympathy and shyness with strangers. He begins to show food likes and dislikes.

18–24 months

By about 18–20 months a child is usually constantly on the move, likes to push things, to walk backwards, to chase and hide and be chased; to play with sand or earth and to climb. He begins to speak a few more words. He likes to listen to rhymes, music and to look at picture books. He enjoys an audience and applause and becomes more sensitive to approval and disapproval. He shows some independence and begins to undress himself. He begins to show temper and fear. He gives names to people, things and actions. He may become attached to a particular toy or blanket. At this stage he learns to control his toilet habits.

From 20–24 months, he enters into a possessive stage where everything is 'mine', and also a negative stage where his reply tends to be 'no'. He becomes more aware of people and copies household tasks in play. Physically his appetite may decrease, his growth slows down somewhat, and his coordination increases – he can kick a ball and he becomes more skilled with the use of one hand. He becomes more aware of father as well as mother, and father often becomes a favourite. He begins to like being with other children.

The toddler: 2–3 years

By the second birthday, the infant has learned to discriminate between foods, between various objects and between people. He has become mobile. If he has had good nutrition, love and attention, he is ready to move into a new stage of growth.

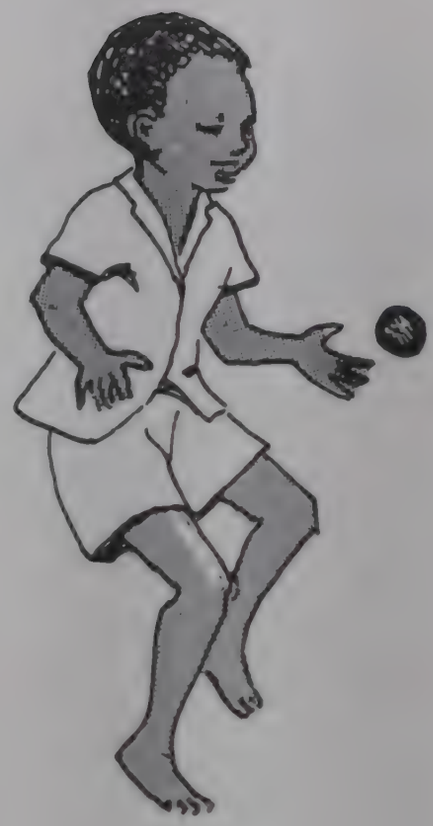
The toddler of this age is developing a trust in himself and he wants freedom to think and explore. Yet he is full of inconsistencies, sometimes negative, sometimes positive, noisy, curious, wants to have his own way; sometimes independent, sometimes clinging. He wants to grow up and still wants to remain a baby. Physically he is very active and vigorous. He is increasingly self-reliant, including undressing and going to the toilet, although he still needs some help in dressing. His appetite is uneven. Socially and emotionally he is unstable, swinging from one extreme of happiness or hunger or possessiveness or self-reliance to another of shyness, indifference, loss of appetite or dependence on others. He dislikes breaks in routine. His intellectual skills increase and he talks to himself and play-acts household tasks. He still enjoys chasing games, playing with water and walking or running independently. He usually makes a favourite of either his mother or father and he has a preference for certain activities. He does not yet get along very well with other children and pushes, slaps, grasps or pinches them, although he wants to be with them. He plays best with one child a few years older whom he respects.

3–4 years

When a toddler reaches 3–4 years old he becomes more anxious to please, to conform, to accept suggestions and to choose between alternatives. He boasts of what he can do. Physically he is outgrowing the toddler stage. He has a full set of teeth, takes responsibility for his toilet needs and needs less protection. He can unbutton and undress himself and usually dress himself, put away his clothes and eat tidily. He progresses from the temperamental stage to become more peaceful. He may develop an imaginary companion with whom he plays house and families and an imaginary world opens up for him. He likes talking and listening to the same stories over and over again. He uses complete sentences and writes scribbles which mean something to him. Often he can carry a tune. He distinguishes between groups of things, between colours, between today and tomorrow and between sex roles in the family. He develops sympathy for others although he can still revert to wanting to be a baby when he is tired.

In his relationships with others he is much more open to reasoning, seeks attention and approval and adjusts easily to new situations and people. He begins to be willing to share with other children and to take turns and he likes to tell others what to do. He may select a special friend or friends to play with but is happy to play alone much of the time. He can become very jealous of a new baby.

4–5 years



The younger child who has tried to please tends to become assertive, boastful, bossy, talkative and self-centred at this age, although he wants friends. He is anxious to learn and full of persistent questions, why? how? when? what? Physically his coordination increases and he can use blunt tools, lace shoes, throw a ball, dress easily, run, hop, skip, jump and climb. He is still growing steadily, about 2 kg (4 lbs) and 7 or 8 cm (3 inches) in a year. He is very active and needs plenty of sleep, about 12 hours each night.

He begins to have a better understanding of many dangers and so has more fears. His temper and refusal to do things show in words rather than by kicking and screaming. He begins to have a conscience which affects his behaviour and he produces alibis to protect himself and his friends. He still has not grasped the concepts of truth and falsehood.

He is growing intellectually, using a larger vocabulary and he enjoys the sound of large words and repeats them over and over often without understanding them. He tells imaginary stories, loves dressing up as an adult, enjoys rhythm and singing and games. His ideas are broadening out beyond home and family to things he can see and learn about in his community. Concepts of time, days of the week, seasons, birthdays, and age have become fairly clear. He becomes inquisitive about death.

He can remember names and places. He is more conscious of sex differences.

The child of 4 years is not so sensitive to praise as he was at 3 years or as he will become at 5 years old, although mummy and daddy are the final authority. He tags along with older children and needs companionship. He is often silly with friends, saying silly rhymes and calling names.

The 5-year old child

The 5-year old child has grown past the fully protected infant and toddler stages and develops a real concept of himself as a person, and new relationships with his brothers and sisters and other members of his extended family. Parents must be willing to give up babying him and must help him to grow by himself by providing materials for play and learning, giving him opportunities to meet new people and to see new things, and encouraging him to try everything.

The 5-year old who has such encouragement is usually businesslike, friendly, interested in adult activities, dependable, independent, serious, keen to carry out projects, and enjoys receiving praise.

The 5-year old can draw, cut, paste, handle small tools. He is very active physically and needs balls, ropes, wheels, trees to climb and the kind of toys which will help coordination and muscle development. Because he is so active, he needs rest periods. His permanent teeth may begin to start coming through.

In some countries the 5-year old goes to school but often school age

begins at 6 or 7 years. Nevertheless the 5-year old is becoming anxious to learn and to help. He likes to do simple household tasks and to run errands. He enjoys being with and talking to people and is sensitive to their praise. He conforms to authority, asking if he may do certain things.

With other children he is likely to be a poor group member, demanding, pushing, and carrying tales. At this age he needs adult supervision.

The parents' job for the pre-school years is to encourage children to try new things, create new things, have fun and gain experience, and to praise these activities. It does not matter if a child's drawing is unrecognizable, or if he nails things crooked or bruises his knees. What matters is the fun he has doing things and the way he feels about his efforts.

The school years

When children go to school they are away from home many hours a week. They become part of another group and participate in group activities. Although the dangers from poor nutrition, infections, and infestations are somewhat less, children still need good food, healthy surroundings and the interest, understanding and encouragement of parents and school teachers if they are to grow into strong, healthy and well-adjusted members of society. Education must gradually take the place of supervision.

The school child becomes part of a group

What simple ideas about child growth and development can we discuss with families?

Parents and other family members are the first and most important source of a child's well-being. They supply the love and care, the food and protection and the early education which make children healthy, adventurous, anxious to learn, secure and happy.

Each child is a person in his/her own right and should not be expected to develop exactly like other children. Although each child has special needs and differences, which parents should recognize and respect, there are also patterns which all children follow, each at his or her own pace. If parents understand these patterns they can help their children better.

If children develop very slowly they may be sick and should be taken to a doctor or clinic for checking.

Young children who get plenty of love, attention, care and help in learning, develop faster and more healthily than those whose parents have too little time to care for them individually. Children learn from people and things around them.

Children need things to see, touch and learn from. Many things from the home, farm and village can be good toys, for example corn cobs, tins or bottle tops.

Children grow in body, in mind and in feelings. These three kinds of growth are related to each other and together give us a view of the whole child.

Good food, good health, and encouragement to practise new skills, for example walking or climbing, help physical growth.

Children need to understand that their parents want them to learn and will not punish them for small mistakes. Praise for trying is important.

Play and playthings, however simple, are important for children's learning. Parents can help children learn through songs, stories, dances, games, pictures and through taking time to help the children make simple toys. This learning prepares children for formal schooling.

The behaviour of a child varies naturally with his or her age and stage of growth and development. Almost all healthy children go through periods of noisiness, bossiness with other children, shyness, jealousy, temper, selfishness and quick changes of mood.

As well as varying with age and growth, children's behaviour results from other causes. It may be that the child is trying to satisfy some need, for example for food or comfort, is frustrated in something he wants to do, does not feel well or is too tired. Parents need to try and see what the child's needs are which make him behave in a certain way – for example being noisy may express a need for attention and reassurance.

Children need to learn to control their emotions so children who show anger or fear should not be punished because this is the way

they learn. Punishment for natural emotions makes children's difficulties worse and puts them against their parents. This does not mean that children should get their own way all the time but that parents should try to understand, help and encourage rather than punish.

The behaviour of a child takes place with other people. If parents help a child to be proud and happy he will show this in his behaviour.

If parents have too many children, one quickly after another, they may not have enough food or money to give their children a good diet, or time to help them to learn and to grow and develop well.

The behaviour of a child takes place with other people

2.5 Family size and child spacing as factors in child health, growth and welfare

We have considered the physical, mental and social–emotional growth of normal young children and what they need to help them grow in all ways into healthy complete active members of society. Now we should think about what kind of a family can meet children's needs. Such a family is one where the parents and other members, because of their love and concern, create a secure and happy atmosphere in which loyalty and a responsibility to help each other, bind the members together. Such a family must have sufficient resources to meet the requirements of all its members for food, clothing, shelter, a healthy environment, opportunities to learn and for leisure and cultural activities, so that positive health and well-being are enjoyed by everyone.

Family size and the intervals between childbirths are closely related to family welfare. In traditional African societies, to have many children has been considered important, because some were sure to die and those who lived were needed to help their parents on the farm and in the home. Having lots of children also made certain that some would be there to look after the parents when they become too old to work for themselves. Now, however, as societies change to 'modern' ways, many more children

live to grow up because diseases have been controlled. These children now go to school instead of helping their parents. More cash is required to pay for uniforms, books and sometimes school fees, as well as for the means to improve the land and crops (seeds, fertilizers, insecticides, etc.), for other goods and services, and for taxes. Money is becoming more and more necessary as a means of reaching a better living standard. As a family's size increases however, any new resources earned are quickly swallowed up as needs grow with each new child born. Poor families become poorer and often cannot provide the basic necessities upon which good health and welfare depend. The change to 'modern' ways is leading to the disappearance of traditional methods of child spacing and to shorter periods between pregnancies. This, in turn, is resulting in new dangers to mothers and children. The mother's health suffers from too-frequent child bearing. The children, although they are no longer likely to die of diphtheria or smallpox, may die because of the poor food and bad hygiene which go with poverty, or may not grow and develop in a normal healthy way.

Let us look a little more closely at some of the effects of a family having more children than it can afford to care for well.

The effect on nutrition and health

The nutritional needs of infants, children and mothers are discussed in Chapter 3 of this volume, but the relationships between family size, nutrition and health are part of the picture which we must consider in thinking about child development.

Poor parents frequently have too many mouths to feed for the money or food available to them, so shortages in both quantity and quality of food occur, followed by slight or severe malnutrition, especially in the young children. The number of children suffering from malnutrition is not decreasing rapidly in Africa, and in some countries it is actually increasing. Many malnourished children do not develop strong healthy bodies, and if the malnutrition is severe and occurs in early life, children may not reach their full possibilities of mental growth. They will have insufficient energy to be active, curious and to learn.

It is now well known that short intervals between births affect the nutrition and health of children. Studies have shown that where birth intervals are small and pregnancies frequent, the younger children have lower birth weights than children born in smaller families and when a period of 2–4 years follows the birth of the previous child. Children with low birth weights have less chance of survival and of achieving good health than have those born within the normal weight range.

Mothers who do not have time to recover between pregnancies become short of nutrients in their bodies and their health suffers.

In addition to the dangers of malnutrition, childbearing by very young mothers, or by women over 35 years, often leads to premature births, congenital abnormalities, complications of delivery or, again, very small

Children die from poor food and poor hygiene rather than from diphtheria or smallpox

babies, putting both mothers and children at great risk. Moreover women over 35 years who already have large families often have less interest in and contact with the youngest members. The safest time to have children is between the ages of 20 and 35 years, with not less than 2-3 years between pregnancies.

Many families cannot send more than one or two children to school

Effect on education

Children in large families where there is not enough food to go round often cannot concentrate and are frequent 'drop-outs' from school. Moreover families with many children may not have enough money to pay school fees for all. Even if no school fees are charged, sending children to school always costs money for clothes, shoes, books and incidental expenses. In many countries there are not enough schools and teachers for the ever-increasing numbers of children reaching school age every year.

The effect on housing and clothing

Family belongings have to be shared among many people. There may not be money to build a house big enough for the family. The various family members may not have any privacy or have space to carry out activities which lead to good child development or increased income for the adults. Often many people have to sleep in one room. Infections can spread rapidly in overcrowded homes and good hygiene is difficult to maintain. Children may not be adequately clothed and may suffer from lung and bronchial infections, very common in many parts of Africa.

The effect on jobs

With the increased rate of population growth, many more children reach the end of school or the adolescent years without the possibility of getting a job of any kind. In areas where land is scarce, the possibility of each child receiving a plot of his own from the family or community is very limited.

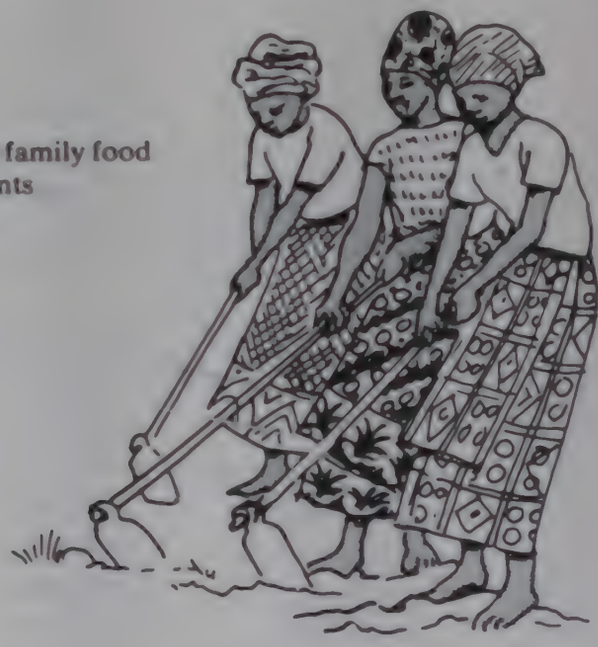
The effect on women's greater participation in development

Women bear and nurture the children and are largely responsible for their growth, development, health and welfare. At the same time they are the growers of food in many parts of Africa; and, as well as growing the family food, many must earn most of the money needed to care for the family and home through the sale of produce they grow or items they make, or through petty trading.

Constant child bearing is one of the factors which restricts their opportunities for improving their earning skills, for increasing their education and for gainful employment, so that their contribution to development is limited.

Men plan development projects . . .

. . . while women grow the family food using outmoded implements



The economic results

The maintenance of children is costly and it has been shown that as the number of children in families increases, levels of living usually go down.

The rapid increase of people, and the survival of more children, mean

that the average age of the members of a family becomes younger and younger. The number (and percentage) of family members who are too young to be productive grows and this is a strain on national and community, as well as family, resources. Money and energy which could have been spent on improving living standards are used up in maintaining the present standards for more and more dependants.

If we look at the other side of the picture, we find that living standards and the kind of food available to families has, in turn, an effect on fertility rates. Parents who lose babies early in their reproductive life tend to reproduce more frequently than those who have not suffered such losses. People still do not have confidence in the survival of their children and, indeed, in individual poor families their lack of confidence may well be justified as still too many children die because poor families cannot take care of them well. Parents are determined to make sure that there will be several children who grow up to help on the farm and to take care of them in old age, and this is often a powerful motive for having a large family. It seems, therefore that malnutrition with high child mortality may be a cause of frequent pregnancies as well as a result.

Why large families?

Nearly everyone has heard of the world 'population explosion'. This means that the world population, including the population of countries in Africa, is growing very much faster than ever before. How did this come about? It is not so much that more children are born as that more children are surviving because of the improvement of medicine. A generation ago, in many African countries, in a family where ten children were born only four or five would live to adulthood. Now if a family has ten children it can expect seven or eight at least to grow up.

Yet many parents go on conceiving children as frequently or more frequently than before. Some of the reasons why many parents do not stop having babies, even when they have several healthy children, are cultural. Large families are considered good and desirable because childbearing fulfills what is considered to be the main purpose of a woman's life and to satisfy the emotional needs of the mother. Men feel that to have many children proves their masculinity and virility. Plenty of children are considered necessary to secure the survival of the race or the religious group. The desire to have boys, and the age of marriage, also influence the number of children.

Nevertheless, the strongest reasons for continuing to have large families probably stem from poverty. As we have discussed above, child deaths, more frequent in poor and uneducated families than in privileged ones, stimulate young parents to have many children to ensure survival of a few. Rural children are still considered working capital, an essential input into the farm if the farm is to show a profit. It is when parents are educated and prosperous enough to give priority to a better life for their children that they begin to think of limiting the number; at this socio-

economic level, the wish to provide advantages for their children often becomes a motive for family planning.

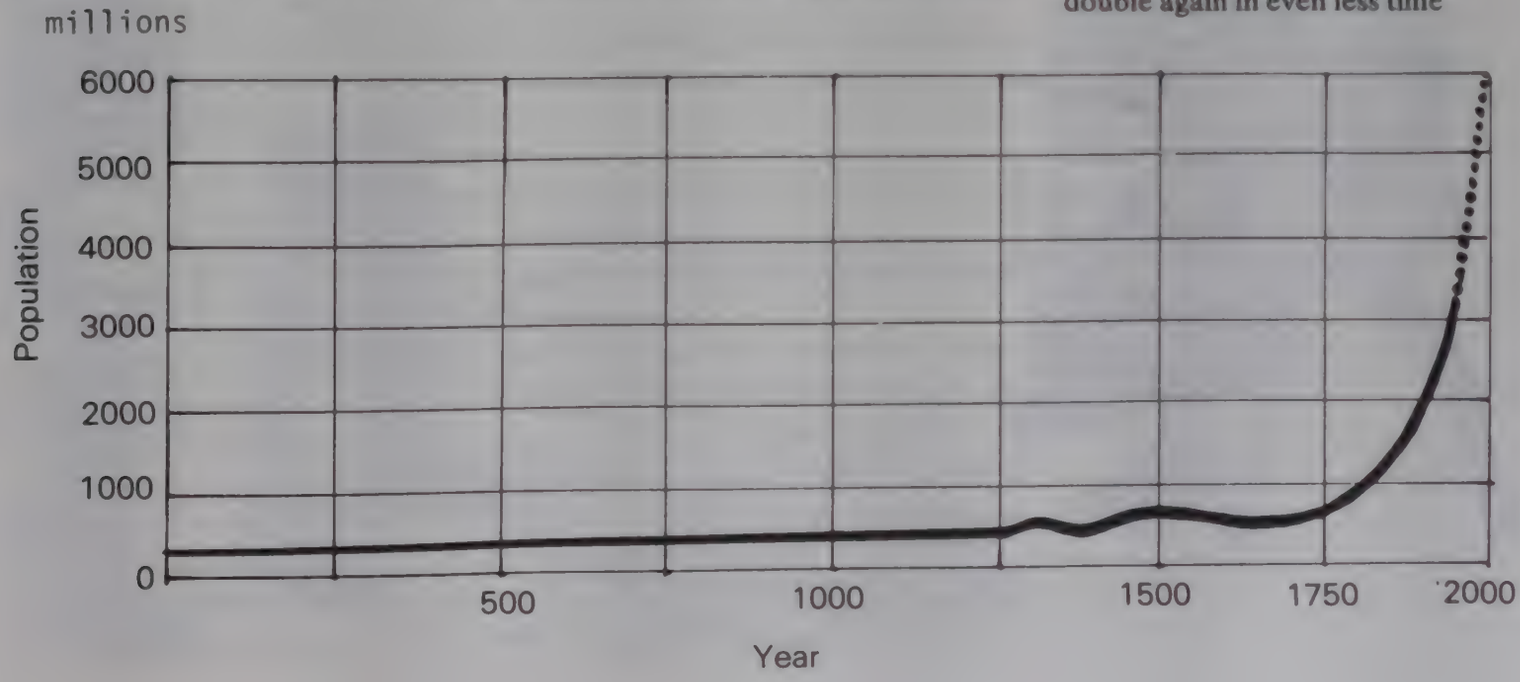
Some of the reasons behind the wish to have large families no longer exist in many countries. National policies of free and compulsory education mean that more children go to school and they are not available to help as much on the farm. Many children on reaching working age, especially if they have been to school, no longer want to work on their parents' farms, and leave home for further training or for jobs. We have seen that the belief that a very high proportion of children will die in early childhood is no longer justified. In spite of these changes, however, acceptance of a small family as desirable is not likely to happen unless:

- the country is developing soundly as well as becoming more prosperous;
- people become convinced that their children will live;
- people really feel that it is important to provide advantages for their children.

Very underprivileged people are rarely interested in child spacing. It takes time and education to change values. To convince men that a few bright, educated and strong sons and daughters to be proud of, are better than a large number of weaklings, is not the work of a year or two only.

2.6 The effect of social and economic development on the future of children

Most countries' economic development depends on bringing birth rates down to a level which will allow a worthwhile increase in income per head, linked with measures to achieve a reasonably fair distribution of wealth. Julius Nyerere, the President of Tanzania has said, 'Development is development of people towards their greater freedom and well-being'. This cannot be achieved when the resources of a family or a nation have

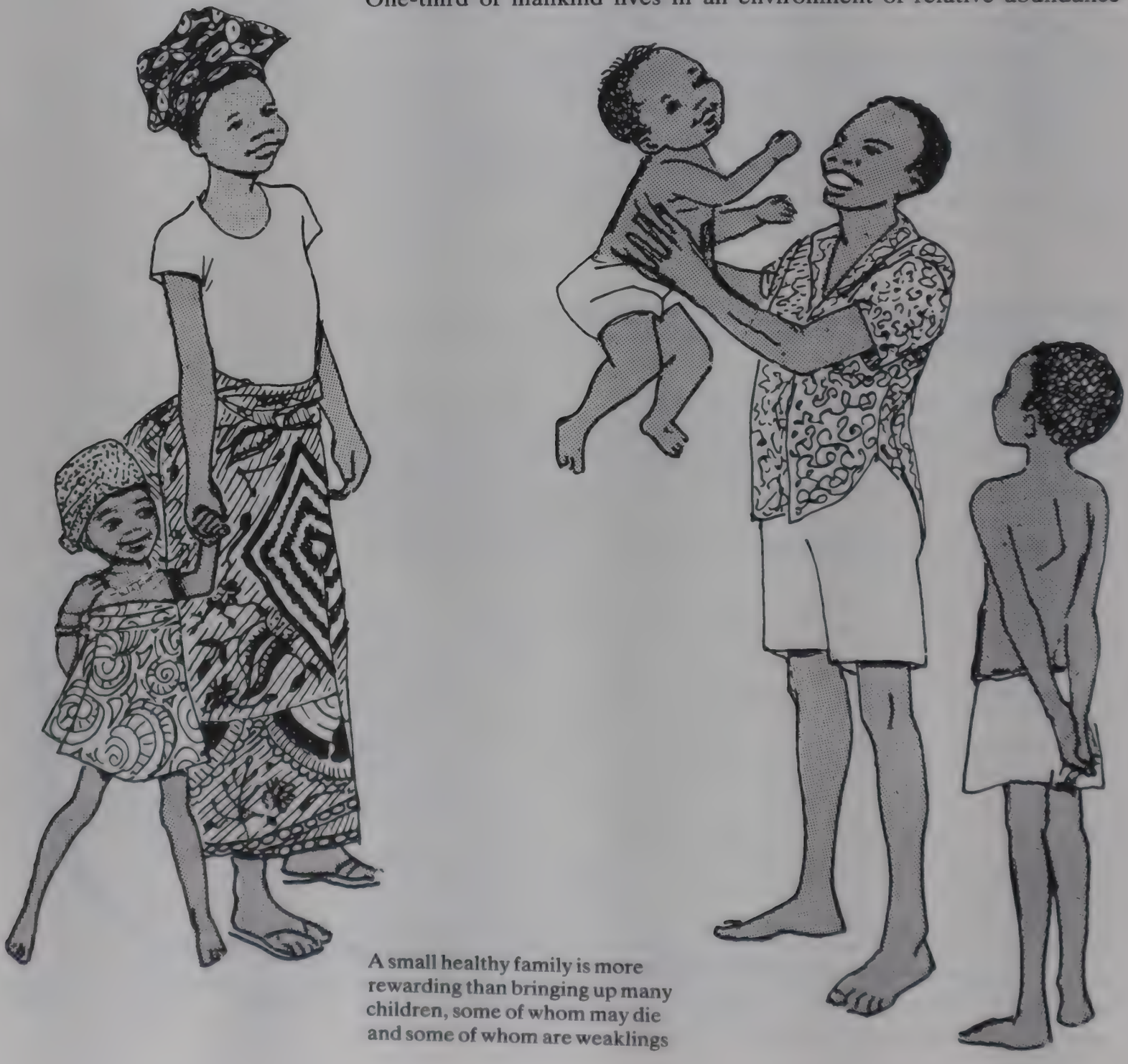


The world's population took many centuries to double after the birth of Christ; now it is doubling in 25 years and will double again in even less time

continually to be used to maintain present levels of living because millions of new people are born every day and need their share. Development and reduction in fertility rates must go hand in hand.

Changes in population growth rates depend on changes in family size. It is the human right of parents to decide for themselves how many children they will have. We, as educators, have to help families to become more efficient in work, to increase their resources and to use them better. We also have to point out the dangers of frequent pregnancies and large families to health and prosperity and the best possible growth and development of children.

The need for development in most countries of the world is desperate. One-third of mankind lives in an environment of relative abundance



A small healthy family is more rewarding than bringing up many children, some of whom may die and some of whom are weaklings

while two-thirds live in comparative poverty and in circumstances which limit their chances of meeting the basic needs for a good life. The World Population Conference in 1974 emphasized that attempts to slow down population growth rates had to go hand in hand with a new economic order and with greater assistance to developing countries. It is widely accepted that both approaches are needed at the same time in most countries of the world.

What simple ideas about family size in relation to child development and welfare can we discuss with families?

Many children in a family where there is not much money means that:

- the children are likely to be badly fed and some of them will die or grow up weaklings;
- there will not be enough for each child to be clothed well and to have good shoes;
- some of the children may not be able to go to school;
- the house may be crowded with children sleeping so close together that infections spread and they often become sick.

A large number of children in a family means that parents have to work very hard to feed and look after all their dependants.

In earlier times, parents could count on the older children helping with the farm. Nowadays many children are not available because they go to school. When they leave school they do not always stay at home to help their parents; some go on to further training; others look for jobs in towns.

A small well-cared-for family in which all the children are healthy and live to grow up and to develop well is more satisfying and more economical than bringing up many children some of whom die, some of whom are sickly.

A man could be prouder of three strong, clever and healthy children rather than of fathering ten of whom several die and others are weak and perhaps deformed.

If children are badly fed when they are very small they are less likely to grow up clever. This often happens when food is scarce in the home and when pregnancies follow each other closely.

If women have too-frequent pregnancies they become weak and sick and they cannot care for their families well.

If a woman has too-frequent pregnancies, the child born soon after a previous sister or brother is likely to weigh less and to be less strong than those born after an interval of 2 or 3 years or more.

If children follow each other too fast, the mother does not have the time and energy to help them to learn and practise new things which assist them to grow in body, mind and feelings.

A large number of children often keeps a family poor as all their goods and money have to be shared among many people.

It is difficult for a family with many children to find jobs for more than a few.

A few healthy, well-developed and clever children can bring wealth and happiness to their family and parents.

Women can get satisfaction through looking after their children well and raising the living standards of their families; and through helping to develop their community and their nation. To help them to do these things they can make money through agriculture, small-scale business and crafts, if they are relieved of the burden of constant child bearing.

Small families allow women time for money-making work

3 NUTRITION, GROWTH AND HEALTH

3.1 Child malnutrition and its consequences

In the previous chapter, the importance of good nutrition and control of infections were stressed as necessary for normal child growth and development. In this chapter, we will examine more closely people's, and especially children's needs for energy and nutrients which must be met if they are to be well-nourished.

Malnutrition, especially among young children is a widespread problem in most countries of the African region. The cause of this malnutrition may be shortage of food or it may be a diet with one or more nutrients missing. In turn, these direct causes may be the result of economic, social, cultural, agricultural or climatic factors which cause a person to eat too little, or too little of certain kinds of food. The indirect cause may also be a parasite infestation which prevents the body from benefiting from the food eaten, or an infection which, combined with a rather poor diet, pushes a child over the borderline from being slightly undernourished into a state of severe malnutrition.

The problems of malnutrition differ from country to country; so do the situations which cause these problems and also their most practical solution. It is only in recent years that malnutrition has ceased to be the responsibility of doctors and health workers only and that people have looked beyond the cure of the malnourished to ways of preventing the condition. Prevention involves a joint effort by all field staff in touch with families, whether they come from health, home economics, agriculture, education or community development services or from voluntary agencies. Working as a team they must educate parents and children and help them to increase their resources. They must help families to increase food production or to buy foods wisely, to raise their incomes, to use their resources well and to space their children so that they can afford to care for them properly. Each educator must play his or her specialized role but must also work with those from other services to strengthen and support each other's teaching.

What are the consequences of widespread malnutrition to families? The parents of a malnourished child suffer unhappiness because their son or daughter is sick and perhaps dies. But this is not all. It has already been pointed out that if a child who is severely malnourished during the first years of his life survives until adulthood, he may grow up a weakling,

Mothers lose many hours in hospital when their children are sick . . .

. . . while their fields are abandoned

incapable of hard work, either physical or mental. Moreover every child who is sick or dies because of malnutrition, frequently combined with infection, costs money which is wasted unnecessarily. The parents have the expense of going to the hospital and of buying medicines. The father may be too upset to do his work well. The mother loses working hours when she has to stay in the hospital with her child instead of cultivating the fields or earning in a job. If the child dies, all the money spent on feeding and clothing him has been wasted, and funeral expenses are high.

An additional consequence when a child becomes severely malnourished and has to be admitted to hospital is that the mother must neglect the rest of her family while she cares for her sick child. The other family members may suffer from her absence. The money for helping the sick child may have to be taken from the school fees of a brother or sister, denying the latter a chance for education. If several children die in a family, the parents, especially if young, are, as we pointed out in the last chapter, more likely to have many babies to make up for the losses and because of fear that another will die. This is not only dangerous for the mother and babies but it may stretch families' resources to the point where it is impossible to feed everyone well.

The cost of malnutrition for a country is also high. The government has to pay for hospitals, doctors and nurses, nutritional rehabilitation centres and outpatient clinics. The malnourished children will not grow into a working force of strong and intelligent men and women needed to develop the country.

Well-nourished healthy children play vigorously

3.2 Identifying nutritional problems

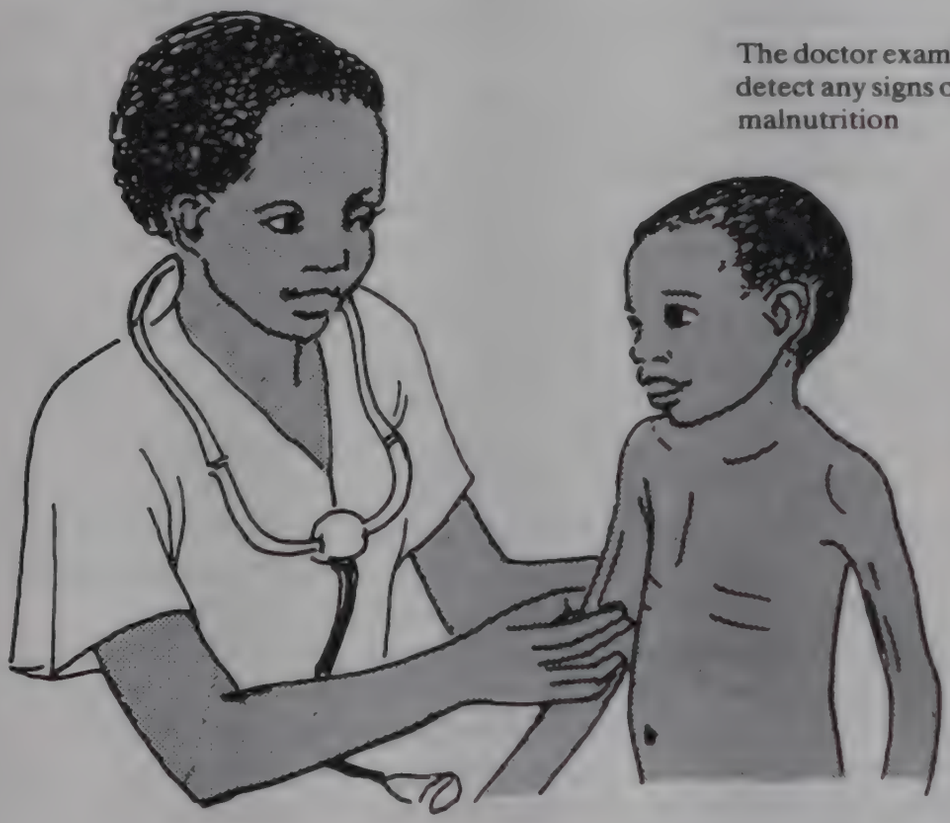
Do we have a problem of malnutrition in our area? Although we are not doctors, can we estimate whether some of the people with whom we work, especially some of the children, are malnourished?

- We can do this by observing people at work and children at play. A malnourished person cannot dig or hoe hard and he gets tired very easily and spends much time resting. A child who is not properly fed will sit around listlessly while his friends play and run about and shout and laugh happily. He will look sad and cry often.
- We can find out their weights. Adults who are too light and too thin for their height are probably not getting enough to eat. Children who do not grow steadily or are much too light for their age are probably undernourished or otherwise malnourished.
- We can observe whether any signs of nutritional deficiency diseases are present.
- We can notice whether children are sick very often. Malnourished children have less resistance to infections than well-fed children; on the other hand, infections or parasitic infestations such as worms or malaria often lead to malnutrition.
- We can find out whether many infants and pre-school children die in our area. We can do this by looking at clinic records, or registers of

births and deaths if these exist, and by talking to health staff and to parents. Many deaths in the age group 6 months to 4 years indicate malnutrition, even if the recorded causes of death are infections such as bronchitis, measles, malaria or diarrhoea and vomiting.

How can doctors, nurses and nutritionists confirm our suspicion that children in our area are undernourished or suffering from a nutritional deficiency?

- The doctor examines the children to see how much fat and muscle they have and whether they are well-developed and free from any signs or symptoms of malnutrition.



The doctor examines the children to detect any signs or symptoms of malnutrition

- The nurse weighs the children to see if their weights fall within or far below the normal range for their ages. She charts the weights of the children each time they visit the clinic to see if they are growing steadily. We shall consider later in this chapter how such a growth chart is used.
- The nutritionist may do biochemical tests to find out the level of different nutrients in the blood and urine and compare these with normal levels.
- Nutritionists may carry out a food consumption study. To do this they record, and sometimes weigh, all the different foods families eat and often those which individual children eat. Then they calculate the energy value of these foods and the amounts of different nutrients they contain. They compare these with the family's requirements for energy and for each nutrient. Energy and nutrient requirements have been found out through research by scientists all over the world,

We can find out what the child is given to eat

mostly during the last 70 years. Research is still going on and we shall learn more and more about nutrient requirements in the future.

What should we do if we think a child is malnourished?

- We must make sure that the parents take the child immediately to the nearest clinic, health centre or dispensary for advice, weighing, inoculations and, if severely ill, for treatment. If the child remains without attention and catches measles or dysentery, he may die quickly before help can be given. We should find out what the child is given to eat by watching him being fed and by recording what is given, how many meals he has, and estimating quantities. In this way we can have a good idea of what is missing from his diet. We can also cooperate with the health staff by giving them this information.
- We should find out the reasons why the child is malnourished: Was he, for example, small at birth because his mother is constantly pregnant? Is his family too poor to provide a good diet? Does his mother lack knowledge of the kinds of food a child needs? Is the child left with an older sister or a grandmother who feeds him pap only? In Chapter 5 of this volume we shall study more of the reasons behind malnutrition and ways of finding out the most important reasons for it in our area. We should help parents to understand their children's food needs and advise them on how to provide the best possible diet within the limits of the money and foods within their reach.
- We should try to find ways of getting rid of the causes of malnutrition, for example if the cause is insufficient food available, we can ask the agricultural extension officer in the area to help the family to obtain better crop yields. If the cause is too frequent pregnancies, we can try to motivate the parents to visit a family planning clinic.

Thus we trainers in family-oriented programmes all have a part to play in the fight against malnutrition, no matter what service we work for. To be able to contribute our best to this fight and to train others to do so, we must learn what are the actual nutritional problems of the people we serve. We must know enough about nutritional science and food to recognize when something is going wrong. We must study the way of life of our clients so that we can identify the reasons for this and so that we can be sure that the advice we give is suitable and acceptable. We must know how to work with other services so that their skills can help to solve the problems we have identified. We must be able to explain things to families in such a way that they recognize that what we say is related to the difficulties they are encountering and are willing to try the action we suggest.

3.3 Nutrition and physical growth

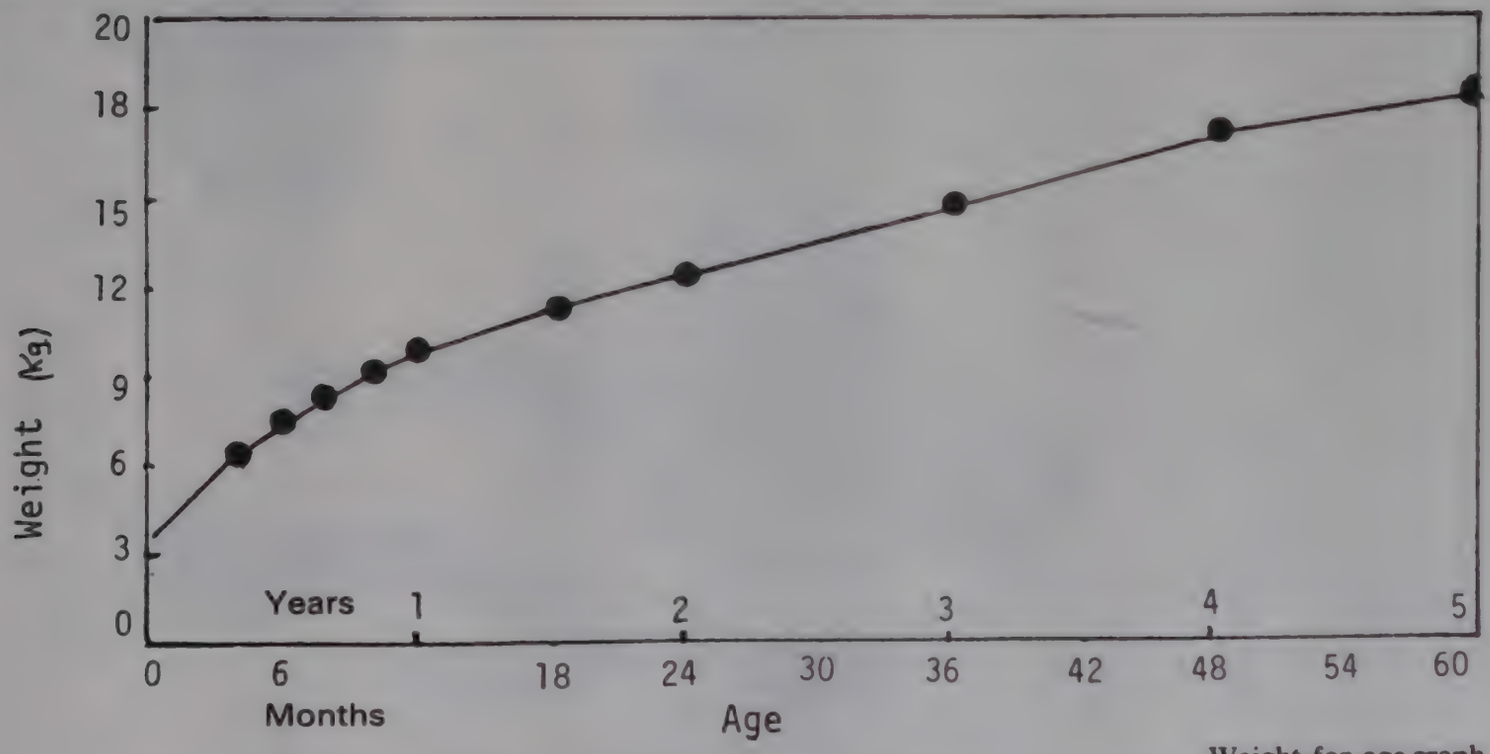
We can begin by considering, in greater depth, nutrition in relation to child growth and development, as physical growth is the best sign of whether a child is healthy and well fed or whether he does not have a good diet for some reason.

Weight-for-age

One of the best ways of judging whether or not a child is well nourished is to find out if he is about the right weight for his age. We do this by plotting his weight each month on a 'weight-for-age' graph. The weight-for-age of healthy children from birth to 5 years should be around those shown in the following table.

Age		Weight	
Months	*Years*	*kg*[1]	*lbs*
Birth		3.4	7.5
4		6.3	13.9
6		7.4	16.3
8		8.4	18.5
10		9.3	20.5
12	1	9.9	21.8
18	1½	11.3	24.9
24	2	12.4	27.3
36	3	14.5	31.9
48	4	16.5	36.3
60	5	18.4	40.5

From these figures we can draw a weight-for-age graph which looks like the one below.



Weight-for-age graph

[1] *The Assessment of the Nutritional Status of a Community*, D. B. Jelleffe, WHO Monograph Series No. 53, Geneva, 1966

From a graph like this it is easy to find out what the approximate weight of a healthy child should be at any given age by:

- finding the age of the child on the bottom scale which gives years and months of age;
- placing a ruler in a perpendicular position at that point so that the edge crosses the graph at the point for the given age;
- placing the ruler in a horizontal position from this point on the graph so that it crosses the upright scale which gives kilos body weight;
- reading off the weight (approximately) which the child should be, at the point where the edge of the ruler crosses the body-weight scale.

The graph shows that up to about the age of one year the infant grows very fast and that growth then slows down somewhat, although he still continues to gain weight steadily.

Weight-for-age is widely used to find out whether children are well nourished and healthy or not. Clinics make records of the weight of children every month and plot them on a standard graph, marked out in months for the first 5 years of life. Such a graph is shown on p. 33. This graph is printed on a card ready for use. The child's birthday month is entered in the first of the heavily lined oblong boxes at the bottom of the graph and the following months are written in the rest of the boxes. The first point on the graph is his weight-for-age on the day the child was first brought to the clinic. This is placed above the correct month. If for example, the child was born in March and first brought to the clinic in

Weight-for-age is one of the best ways of judging if a child is properly nourished

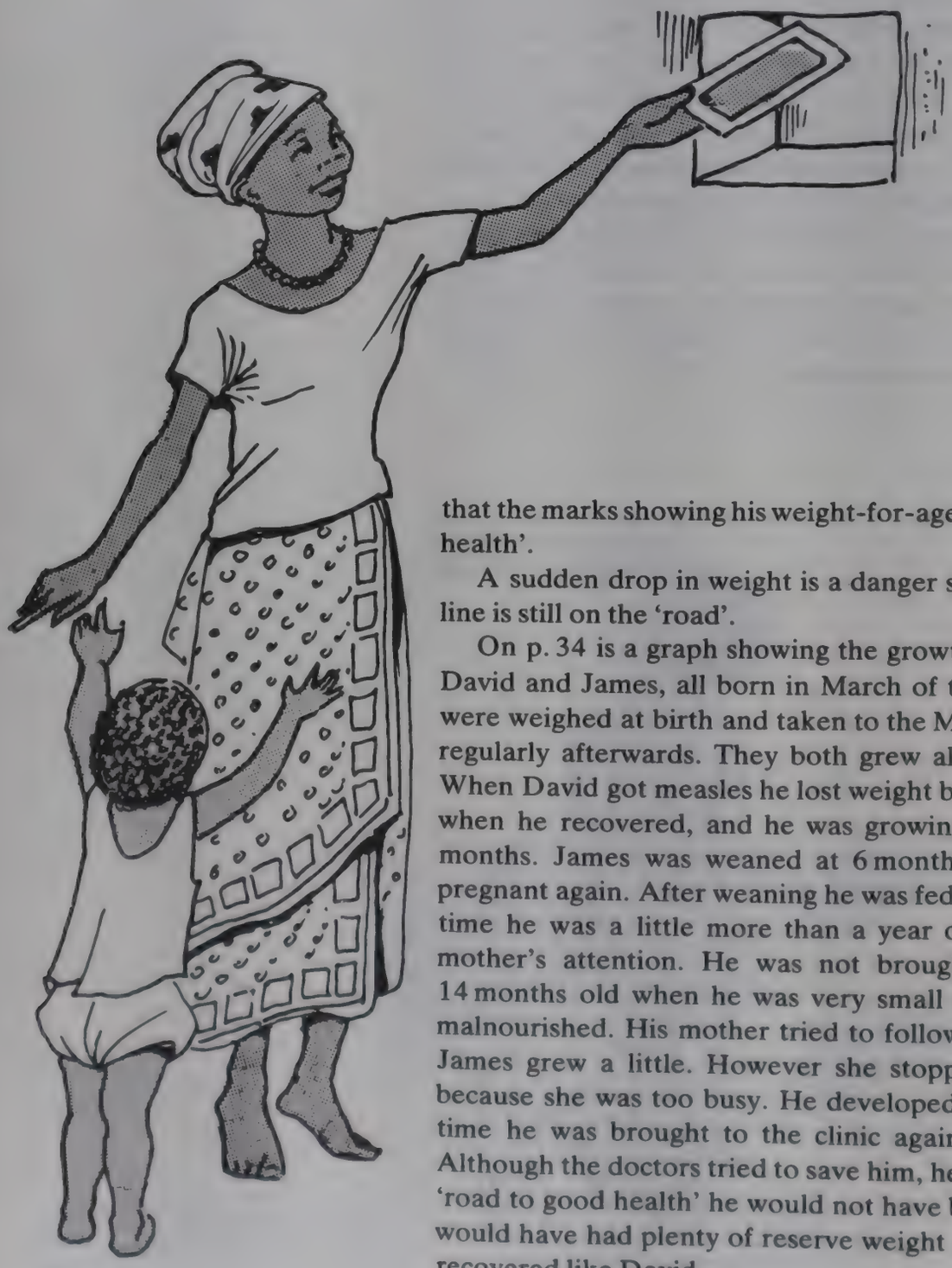
August, then March would be entered in each of the heavily lined boxes, with the other months filled in between. In August he would be 5 months old and his weight at 5 months would be entered above the August box.

Since all children, even if they are healthy and well fed, do not grow to exactly the same weight-for-age because they inherit different types of body build, two lines are drawn for the standard graph showing the upper and lower growth patterns for healthy children. Almost all healthy, well-fed children will have a growth curve which falls between these two lines. Children above the highest line may be obese, although they may just be very big and healthy. Children below the lowest line are likely to be malnourished. The space between the upper and the lower normal growth lines is called 'The road to good health'. If a child's weight-for-age at each weighing falls within this space so that his growth line follows the 'road to good health', parents can be confident that he is healthy and getting all the food he needs. However it is not the individual child's weight at *any one time* which is the most important evidence of his health and nutrition but whether his weight line is progressing steadily parallel to the lines on the graph. An individual child of very slight build might, for instance, have a growth curve below the 'road to good health' but still be growing healthily. If, however, many children in a community have weights below the bottom edge of the 'road' we can be sure that the children in that community are malnourished.

All children, even if well, should be taken to the clinic for regular weighing

The other side of the card is used to identify the child, to give general information about him and to record the dates of his immunization against various diseases, birth details and medical history. Sometimes simple health instructions are given on the card, for literate mothers. Sometimes the graph for 3–5 years is printed on this side of the card, allowing more space for the first 3 years on the inside.

Often the card is kept by the mother in a strong plastic envelope, especially made to fit it. The mother brings the card with her whenever she brings her child to the clinic. Because the mother keeps the record card she becomes more interested in the child's growth and understands

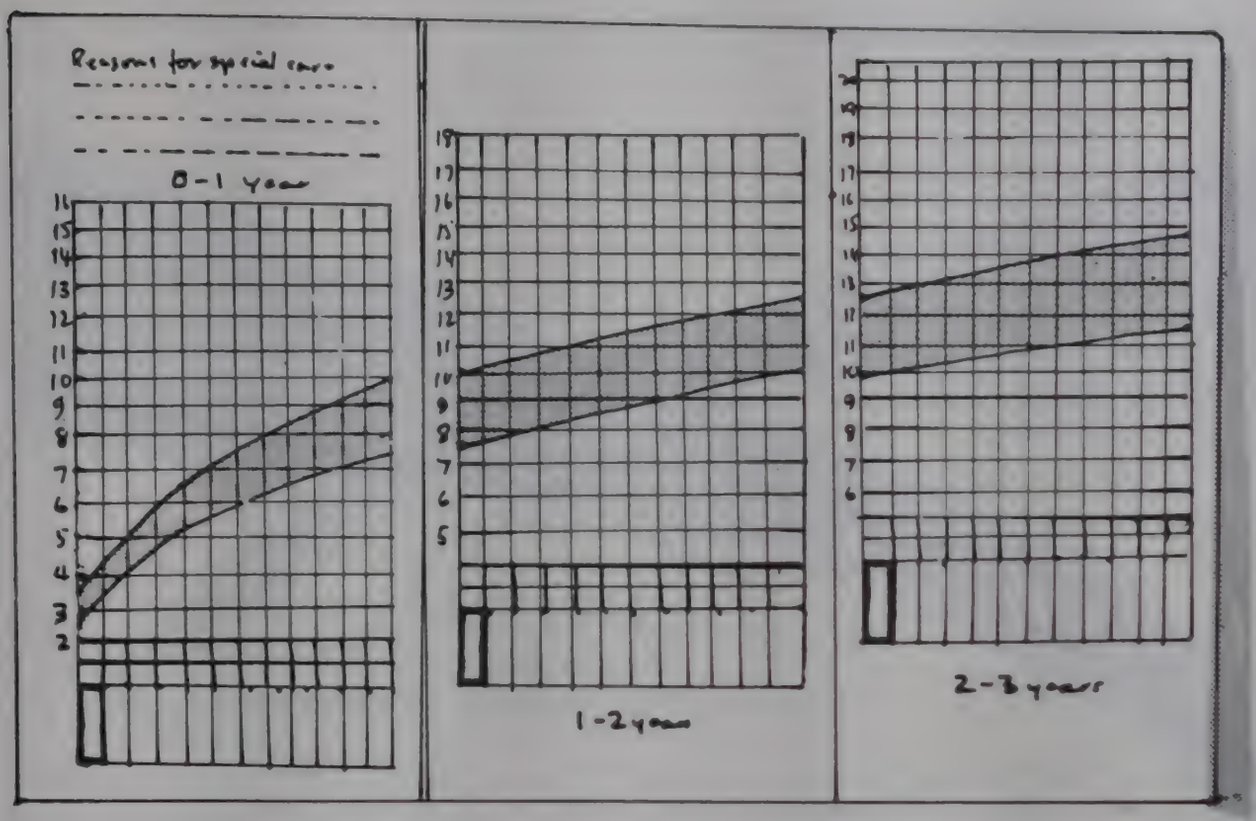


The mother keeps the card in a safe place

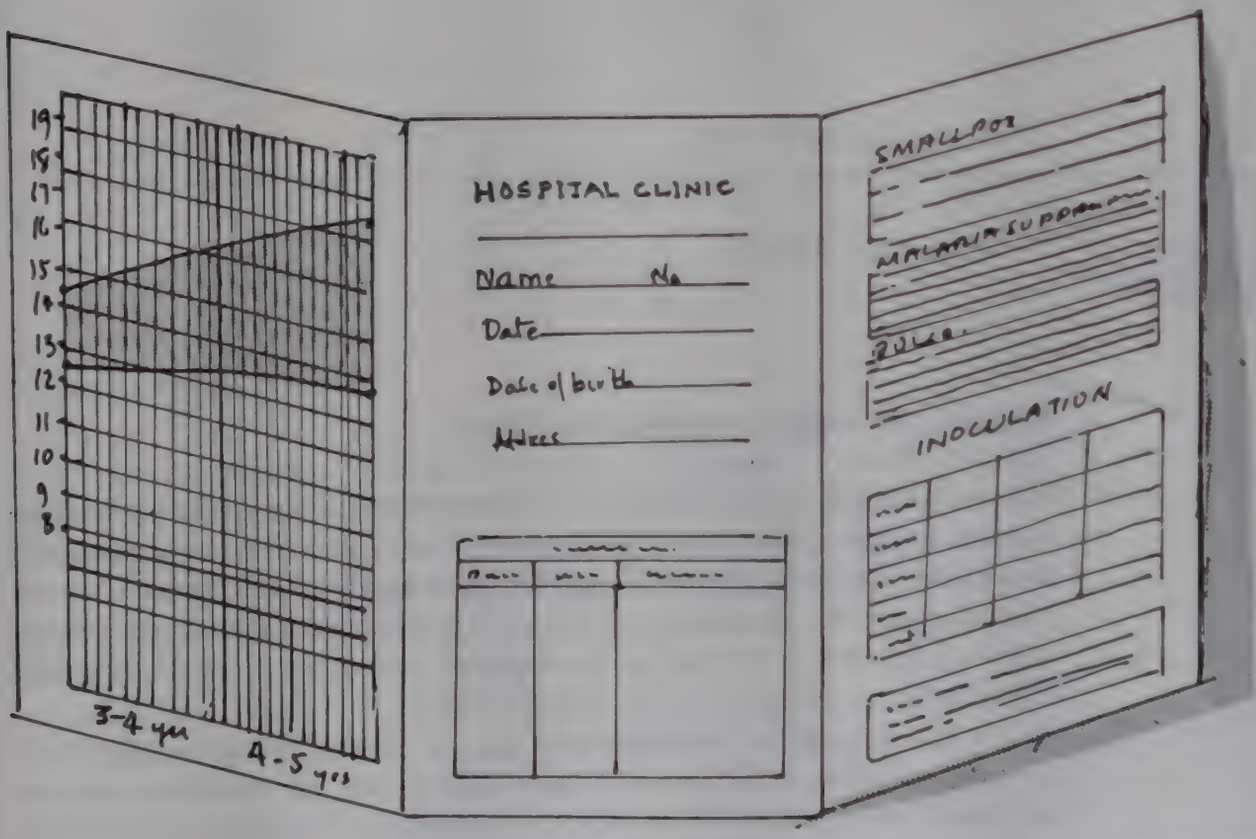
that the marks showing his weight-for-age should follow the 'road to good health'.

A sudden drop in weight is a danger signal even if the child's growth line is still on the 'road'.

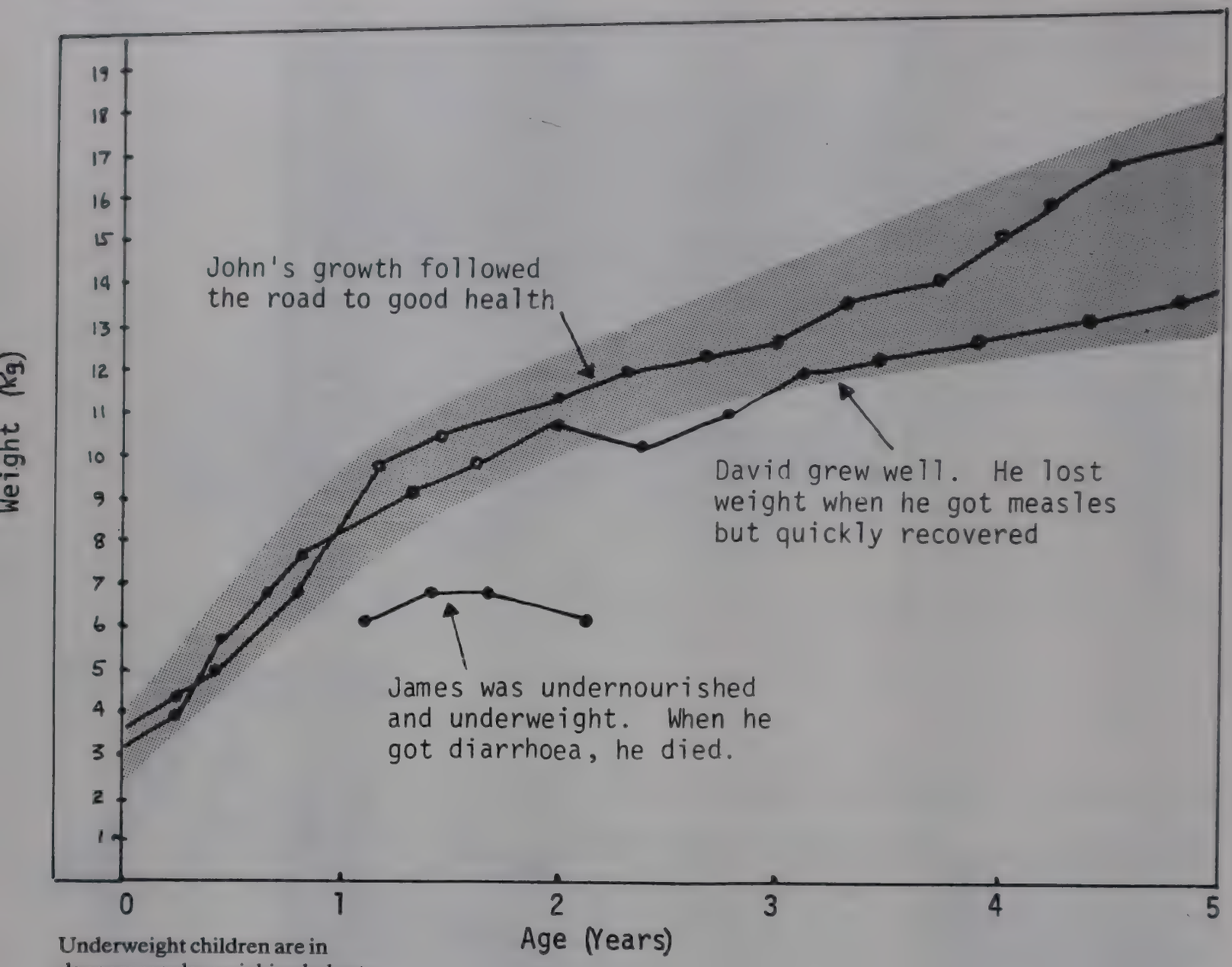
On p. 34 is a graph showing the growth lines of three children, John, David and James, all born in March of the same year. John and David were weighed at birth and taken to the Maternal and Child Health clinic regularly afterwards. They both grew along the 'road to good health'. When David got measles he lost weight but he soon started to gain again when he recovered, and he was growing as well as ever within a few months. James was weaned at 6 months because his mother became pregnant again. After weaning he was fed mostly on thin paps and by the time he was a little more than a year old the new baby occupied his mother's attention. He was not brought to the clinic until he was 14 months old when he was very small for his age. He was obviously malnourished. His mother tried to follow the advice she was given and James grew a little. However she stopped bringing him for weighing because she was too busy. He developed chronic diarrhoea, and by the time he was brought to the clinic again he had lost a lot of weight. Although the doctors tried to save him, he died. If James had been on the 'road to good health' he would not have been in such danger because he would have had plenty of reserve weight and resistance. He would have recovered like David.



A 'road to good health' chart, from birth to 3 years



The other side of the card gives the graph for 4–5 years and other useful information



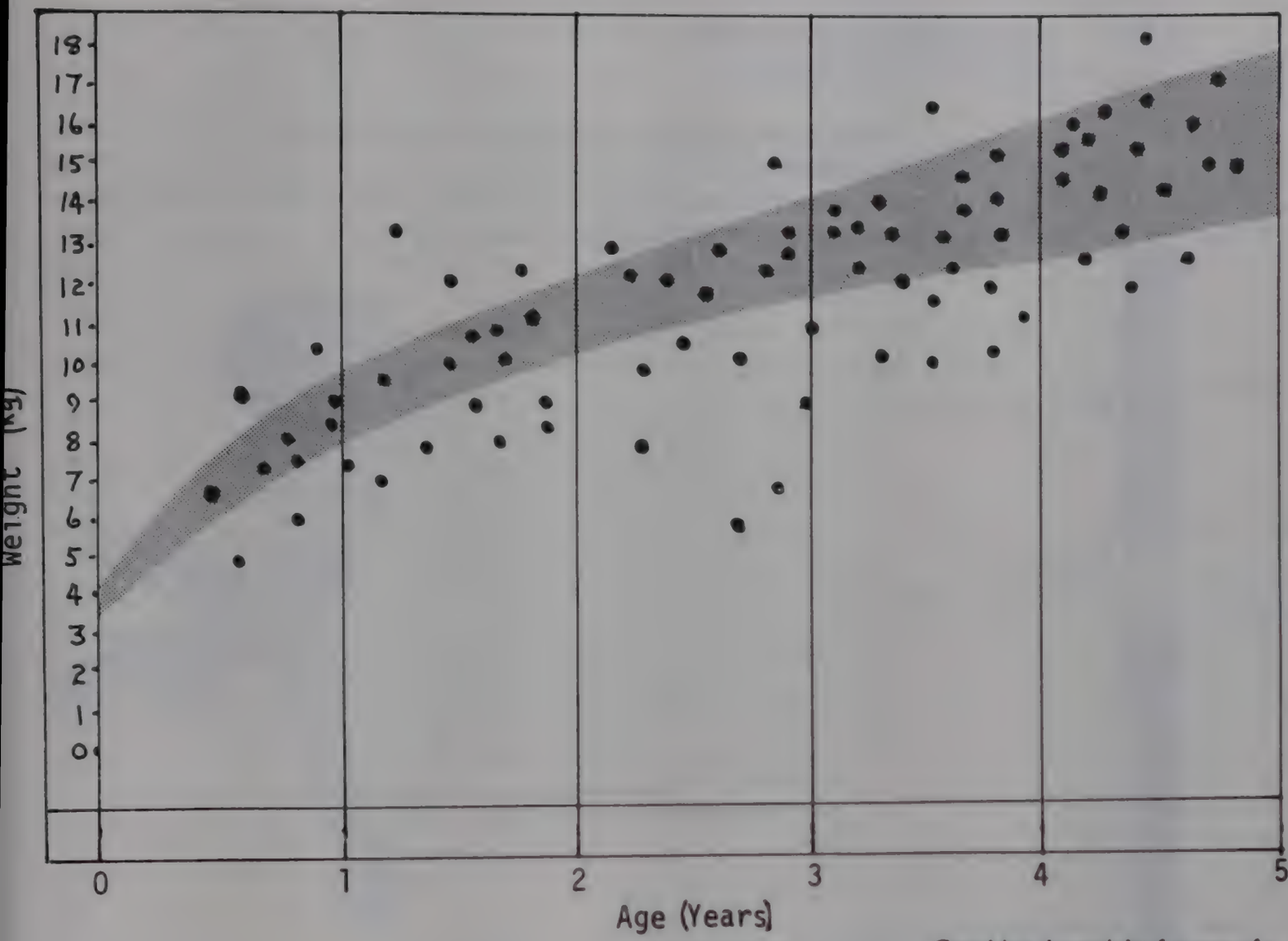
Underweight children are in danger; regular weighing helps to avoid this risk

Graphing the weight of a group of children

The weights-for-age of many children at a given survey period can all be plotted on the same graph. The number, and thus the percentage, of children whose weight falls below the 'road to good health' can be easily counted, and the percentage of the total number of children calculated. This is a good way to confirm or disprove our suspicion that the young children in our community are malnourished.

We can arrange for the children in the day care centre or community to be weighed at the same time, and their weights-for-age marked on a 'road to good health' chart. From this it is easy to see whether the group is malnourished or well fed.

The graph on the next page shows that there is a problem of malnutrition in the community studied.



Graphing the weight-for-age of a group of children can show us whether the children in our area are malnourished

Skinfold thickness

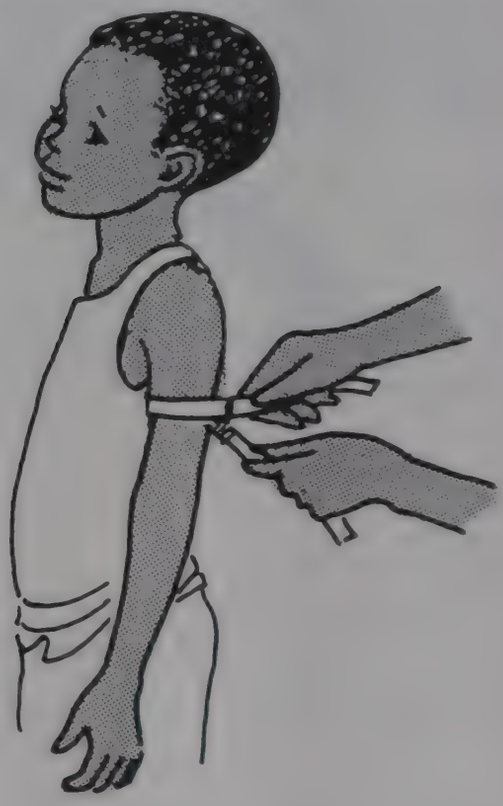
A rough estimate of a pre-school child's nutritional state can be obtained by gently pinching the skinfold at the inner middle part of the upper arm. If the thumb and forefinger meet with only the thickness of skin between, that is without any fat under the skin layers, then a certain amount of undernutrition is present.

Activity

As children grow older they grow in other ways than in weight. They grow taller and their heads and chests and arm and leg muscles get larger. A child should be walking and talking about as well as the other children of his age. He should be very 'active', lively and cheerful, and interested in

The tape or strip can be marked and coloured in bands for easy use

things around him. As we mentioned earlier, a good way to tell if children in a group are healthy and well nourished is to watch them at play. If they run about vigorously they are all right; if they sit about and are listless they are almost certainly malnourished or sick.



Measuring the arm circumference of children 1–4 years old gives a good indication of their nutritional state

Arm circumference

A useful method of estimating the nutrition of young children is to measure their upper arm circumference. A healthy child between his first and fifth birthdays should have an arm circumference around 15–17 cm which remains about the same size during these 4 years. If it is less than 13.5 cm, the child can be considered somewhat malnourished, and if the measurement is less than 12.5 cm, the child is likely to be dangerously malnourished. As the circumference of a child's arm does not increase much during this period, this measure can be used even if the exact age of the child is not known.

In measuring arm circumferences, use a tape, cord or strip of plastic which will not stretch. Always measure the left arm when it is hanging straight (*not* bent at the elbow). Measure in the middle of the upper arm.

For field workers not accustomed to reading measurements, the tape or strip can be coloured in sections, red for danger, yellow for warning, and green for safe[1]. When a black starting mark on the strip overlaps with

[1] Adapted from a description by Dr David C. Morley, Professor of Tropical Child Health, Institute of Child Health, University of London.

a particular colour when encircling the arm, the child can be immediately classified as well-nourished, mildly malnourished, or dangerously malnourished without reading the centimetres.

A used and cleaned X-ray plate from the hospital can be marked off to show 17.0 cm, 13.5 cm and 12.5 cm circumferences and the bands between and below these parts scratched with a sharp point. The bands can then be coloured red, yellow and green (or other suitable colours) with felt pens. The plate can be cut in ½-inch strips to make many measuring tapes excellent for this purpose.

Measuring the arm circumferences of a group of children between their first to fifth birthdays is one good way of estimating the prevalence of malnutrition or of good nutrition in a group of young children. The numbers and percentages of children in the 'red', 'yellow', and 'green' groups can easily be found and percentages of the total number of children calculated. Different countries may prefer to use other colours more appropriate to their own culture than red, yellow and green.

We may sum up by saying that if a child does not get enough of the right kinds of food he will not grow as he should, and he is likely to be small for his age, that is underweight. To be much underweight puts a child in danger, as any infection may lead to acute malnutrition and death. But a child who is well fed and well cared for is likely to grow up strong, healthy, cheerful, eager to learn and to do his best in class when he reaches school age.

Children who are well fed and well cared for grow up strong, healthy and eager to learn

What practical ideas about children's growth can we discuss with families?

Children grow properly if they are well fed.

Weighing a child regularly is the best way to check if he is growing well.

Mothers should take their children to the clinic regularly to be weighed, even if the children are well (use the appropriate word: child health clinic; child welfare clinic; MCH clinic; or under-five clinic).

The child's weight for his age should follow the 'road to good health' on the clinic card.

If a young child stops growing it means that he is ill.

If a child is not properly fed in his first 2 years he may grow up less clever than he should be because his brain may not develop as well as it could, or because he does not have energy to learn.

Many pregnancies close together are likely to result in babies who are underweight and in danger.

Underweight children are in danger because if they catch an infection they do not have much resistance and many die.

If children do not grow properly they cannot play actively and develop muscles and good coordination.

When they grow up, they may not be strong enough to work hard to make their family better off and to help their countries.

Underweight children who are not well fed often do badly at school because a badly fed child cannot attend well and concentrate on the lesson.

Plenty of good food will make children grow big and strong, and help them to be clever.

3.4 Energy required for good health and growth

Our bodies need a wide variety of nutrients for healthy growth, maintenance and activity They need materials which give energy: carbohydrates, fats and proteins. They need materials for building the different parts of their bodies: proteins and some minerals. They need materials for regulating all chemical and physical activity and to help them to resist disease: vitamins and some minerals as well. In addition to carbohydrates, fats and proteins, there are more than 12 minerals and more than 12 vitamins needed. However most of these are required in very small amounts and are found in all diets in sufficient quantities for healthy people, so we do not have to worry about them. In most countries in Africa we need only consider the following requirements when we are checking to find out if diets are adequate.

Energy

Energy is measured in calories or in joules. A calorie *in nutrition* is the amount of heat needed to raise a litre of water through 1°C. Calories are obtained by the body from the 'burning' (oxidation) of carbohydrates, proteins and fats. The result is carbon dioxide and water, plus heat and energy. We cannot see a flame when these foods are 'burned' by the body because the temperature is not high, but the process is the same as in burning anything else. We give the carbon dioxide off from our lungs and the water off mostly in urine, sweat and in our breath.

1 gram carbohydrate gives 4 calories
1 gram protein gives 4 calories
1 gram fat gives 9 calories, that is more than twice as many as from a gram of carbohydrate or protein.

The unit of a calorie has always been used by nutritionists and it has been used in some other sciences too, but not in all. Some sciences have used *joules* as their units of energy. In order that all scientists use the same units of measurement of energy, an international system has been adopted and in the future all scientists, including nutritionists, are likely to use joules as units of energy. One nutritional calorie equals 4184 joules or 4.184 kilojoules. In other words there are just over 4 kilojoules to a nutritional calorie.

In this manual, however, because food composition tables and nutrient requirements tables have not yet been published in kilojoules in forms suitable for our use as educators or trainers, we will still think in terms of calories. These can be changed to approximately the equivalent number of kilojoules by multiplying by 4.2.

The food is 'burned' with oxygen (which is taken in by our lungs) to produce energy just as a truck engine burns diesel oil with oxygen from the air to produce power (energy) for the truck to run. At the same time heat is produced in the body as in a truck engine. Some heat is necessary for our bodies to keep our temperature normal. The extra heat not needed for this is given off by the skin. Energy for the body comes from food and when there is not enough food, energy can only be got by the breaking down and burning up of body tissues[1] – so people become thin and may eventually starve.

The body needs:

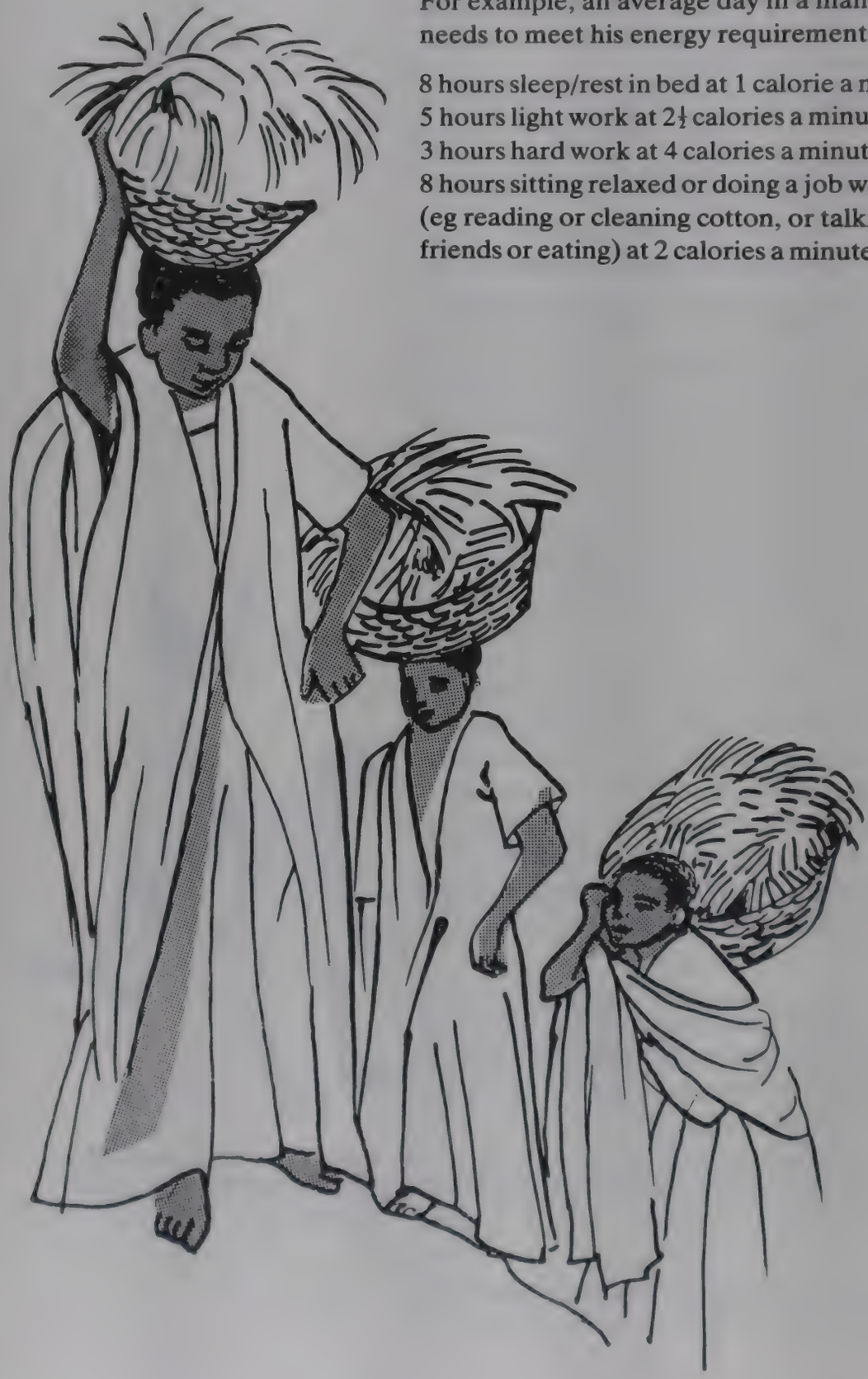
- energy to keep the heart, lungs, liver, kidneys, and other parts going, and to keep the body at normal temperature. This energy is needed for a person to live. This use of energy takes priority over energy for activity or growth when food is scarce;
- extra energy to move muscles, for work and play;
- energy for growth (for children and pregnant women) and for repair of tissues (for everyone).

Calories from food are needed for life, for growth and for vigour to work and play

[1] Tissues mean the substances, for example muscle tissue, liver tissue, fatty tissue, which form the solid parts of the body.

Activities which require more muscle movement use up more calories. Scientists can measure the number of calories a person uses during each activity and during resting and sleep by measuring the amount of oxygen 'burned' and the amount of carbon dioxide given out. By multiplying the calories used per minute during each activity by the minutes spent on the particular activity and then adding together all the calories used in 24 hours, the daily calories requirement of a person can be worked out. For example, an average day in a man's life, and therefore the calories he needs to meet his energy requirements might be:

8 hours sleep/rest in bed at 1 calorie a minute	480 calories
5 hours light work at 2½ calories a minute (eg herding)	750 calories
3 hours hard work at 4 calories a minute (eg hoeing)	720 calories
8 hours sitting relaxed or doing a job where one sits (eg reading or cleaning cotton, or talking with friends or eating) at 2 calories a minute	960 calories
	2910 calories for 24 hours



Hard physical work uses a lot of calories

The energy requirements of healthy people vary according to the following.

- Body size: Big people need more calories than small ones. If, however, the big people are very fat, this may not be true as fatty tissue does not use up calories.
- Age: Children need extra calories for growth. Old people need fewer calories than young ones of the same size because their body processes and physical activity gradually slow down.
- Climate: In a very warm climate fewer calories are usually needed largely because people often reduce their physical activity in hot weather.
- Pregnancy: A woman requires extra calories for the growth of the foetus and associated tissues. If physical activity is greatly reduced, the extra calories needed may be very few, or none, but this does not often happen in rural families in Africa.
- Lactation: A woman breast feeding her child needs extra calories to produce milk.

If an adult does not have sufficient energy from food, he cannot work hard and tires easily. He may lose weight. This is the same for men and women.

A pregnant woman needs extra calories for the baby growing in her womb

Children vary in the amount of food they need; some thrive on less than others, even from birth. The best way to tell whether they are having enough is to take them to a clinic regularly for weighing.

If a child does not have enough energy for food, he first becomes inactive and listless, then he ceases to grow.[1] Lastly he may develop a nutritional deficiency disease called marasmus, which is really a kind of starvation. Often this disease occurs when a child who does not receive enough food also gets an infection or a parasite infestation, such as measles, diarrhoea or worms. If the marasmus is linked with diarrhoea and vomiting, the child may lose so much water from his body that he dies of dehydration (thirst) before he dies of starvation.

Children suffering from marasmus become 'skin and bones'. Their skins are loose and wrinkled and they look like little old men. Such children are in great danger of death and must be taken for treatment urgently.

In most situations in Africa, there is much more likelihood of people having too few calories rather than too many. However some people who are able to afford as much rich food as they want, and who do not use much physical energy in their jobs, may eat more than they need and therefore have more calories than their bodies use. They store the extra food in their bodies as fat and so become fat (obese) people. This brings many health dangers including heart diseases, varicose veins and diabetes. Town people are most affected.

[1] Calorie deficiency is also frequently linked with protein deficiency (see pp. 55–60).

People who do not have enough energy from food tire easily

What practical ideas about the body's needs for energy from food can we discuss with families?

Food gives us the energy to live, to grow, to work and to play

The energy we need to keep our bodies alive and warm and to work and play comes from food. Children also need energy from food to grow.

The body uses the food for fuel just as the truck uses diesel oil or petrol for fuel to make it go.

Women need more food in pregnancy, especially in the second half, than at other times because they need extra energy for the growing babies in their wombs.

Nursing mothers need more food than women who are neither pregnant nor nursing because they turn some of their food into milk.

Adolescent boys and girls need more food than adults because they are growing fast as well as working and playing.

If people are working hard they need more energy and therefore more food than people who work at a desk.

People who are not labouring in the fields or factories need less food than people who do hard physical work.

If an adult does not eat enough food to give him or her the energy needed, he or she will first lose weight and then work less hard.

When many people in a village are short of food they do not have enough energy and they become very thin. They are not able to work hard on their farms so they grow even less food; so things go from bad to worse for the people in the community.

Children need extra energy to grow as well as for keeping alive, keeping warm, playing and working. If a child does not have enough food for all these things he does not run about but sits quietly. Because of this, he does not have the chance to explore and to learn about his surroundings and he becomes dull. Then he stops growing. Lastly he may lose weight, and in the end he may die.

If a child becomes underweight he is in danger. An infection like diarrhoea and vomiting or measles may make him so thin that he becomes like a starved person. His skin is loose, the shape of his bones shows, his eyes are sunken, and he looks like an old man. He has usually lost so much water as well as weight from his body that he may easily die quickly of thirst even before he dies from hunger. This disease is called marasmus (use local name for marasmus). A child like this is very ill and must be taken to the hospital or clinic immediately.

When people eat more than they need they become very fat and this is very dangerous for health.

A child who is underweight is in danger.
An infection may make him very sick and he may even die

Food sources of energy

The calorie values of the three sources of energy in food, carbohydrates, proteins and fats, were given on p. 39. Fat, supplying 9 calories per gram, is obviously the best source, but fats are often expensive. Carbohydrates, which give 4 calories per gram, are usually the cheapest source of energy in African diets. However, there are differences in the quality of high-carbohydrate foods, depending on what other nutrients they contain as well. Pulses, nuts, seeds and cereals, all rich in

energy from fats and/or carbohydrates, also contain valuable amounts of protein with the same energy value as carbohydrates in addition to being building materials. All these foods contain valuable minerals and vitamins as well (see pp. 49–65). Starchy roots and fruits, such as cassava, yams and plantain, on the other hand, give very little except calories but the leaves of some of the root plants provide worthwhile amounts of protein as well as being good sources of some other nutrients. If both roots and leaves are eaten together, the leaves improve the mixture.

Ordinary sugar is a pure carbohydrate which provides nothing else so we call its calories 'empty calories'. It is not necessary in the diet of healthy people since the body manufactures sugar from other carbohydrates. Sugar, and sweets made from sugar, cause tooth decay.

Meat (except when it is fat), fish, milk, and eggs have a high proportion of water in them so that they are expensive sources of calories, although they are rich sources of other nutrients (proteins, minerals and vitamins).

Food consumption studies in Africa have generally shown that people, especially women and children, often have diets too low in energy value. It is desirable to have some small quantities of animal foods in the diets of toddlers after weaning. If money and food are scarce however, it may not be always wise to try to teach women to use generous amounts of the expensive high-protein animal foods: the result may be to cut down the total quantity of food (calories) in an attempt to improve quality. The proteins from the animal foods may be 'burned' for energy if the calorie intake is insufficient, and this can lead to protein–energy malnutrition (see p. 55).

In some areas it is better to encourage families to spend their efforts and money on producing or buying a variety of high-calorie foods of vegetable origin, which also give plenty of protein (pulses, seeds, and cereals) than to insist that eggs and meat are essential for good diets. Nowadays poultry feed is very expensive, cattle are often scarce because of tsetse fly, and milk production so low that its cost is beyond the economic possibilities of families. The baby and young toddler need some animal food but mother's milk, the natural animal food for human young,

Starchy roots and fruits give plenty of calories but very little else

Pulses, nuts, seeds and cereals are all good inexpensive sources of energy which give other important nutrients too

with supplements of cereal and pulse mixtures, will give them what they need. It is after the children are weaned that their danger increases, and if any animal foods can be afforded, the weaned toddlers should receive a generous share in proportion to the other members of the family. Their need for high quality body-building foods is greater than that of adults and they cannot eat large quantities of vegetable high-calorie high-protein mixtures because their stomachs are too small and their digestive systems not fully developed.

Often children are given diets providing too few calories for their needs, not because of poverty or unavailability of food, but because of traditional feeding habits. Common practices which lead to underweight in children in Africa are: supplementing breast milk too late; diluting foods such as gruels until they are mostly water; and feeding young children too few times a day to allow their small stomachs to take in enough food. Often school children go without breakfast and many do not eat an adequate lunch.

Education could solve most of these problems.

Many children in Africa are underfed because of poor child feeding practices

What practical ideas about making sure that children have enough energy-rich foods can we discuss with families?

The foods which give us plenty of energy, which are not too expensive, and of which we can eat large amounts are cereals like maize, sorghum, millet, wheat, rice, and teff; roots like yam, cassava, sweet potato, potato and cocoyam; and starchy fruits like plantain, and breadfruits. Cereals are important because they give body-building foods as well as energy, and also other things needed for growth and health.

All kinds of pulses such as groundnuts, soya beans, beans, grams, and lentils; seeds like simsim (sesame, benniseed) and pumpkin or melon seeds; and nuts of all types, are even richer in energy than cereals and starchy foods. We should eat some of these every day together with cereals, roots or starchy fruits, as they also give lots of building and protective materials.

Oils and fats, such as cooking oil, dripping, margarine, butter and meat fats, are the highest in energy of all foods. They increase the energy of meals without adding much to the bulk and also improve the flavour of cooked foods.

Nearly all foods give us some other materials which our bodies need for health as well as giving energy. However, sugar gives energy but does not give anything else. People do not need sugar because the body makes sugar from other foods. Moreover, eating sugar makes the teeth decay. The good teeth of African children are partly the result of their eating much less sugar than children in Europe.

A good breakfast starts the day with plenty of energy

A packed school lunch keeps a child energetic and attentive

A mother must make sure that her young children have enough food, and thus enough energy, by:

- giving them at least four meals a day;
- avoiding making porridges and other foods too watery so that young children cannot eat enough of the food from which the porridge was made;
- giving her children some fairly dry foods such as biscuits made from groundnuts or other pulses, and cereals (see pp. 147–151) or bread, or mashed peas or beans.

A mother must also be sure that her young childen have their evening meal before they are too sleepy to eat it.

She should give each young child his or her own plate, so that they are not deprived of their fair share of food by elder brothers and sisters who can eat faster.

She must make sure that children going to school have breakfast first.

She must see that children of school age have three good meals a day. If they cannot come home or have lunch at school, they should carry a packed lunch.

She can add energy as well as flavour to the family diet by using some fat in cooking.

She can help to make sure that the family is not hungry in the months before harvest by preserving some of the foods she grows or gathers when these are plentiful, and by using good food storage methods.

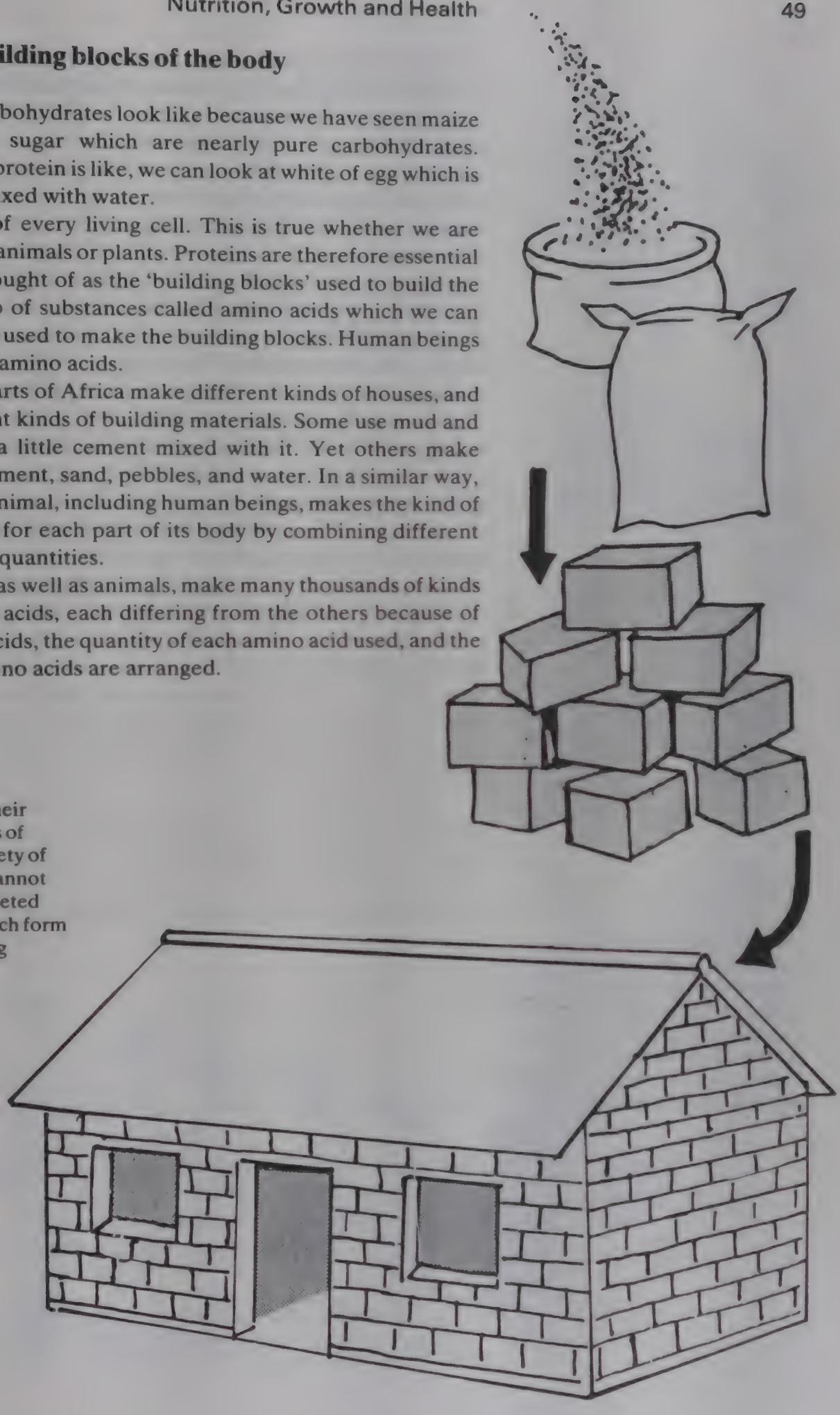
3.5 Proteins, the building blocks of the body

We know what some carbohydrates look like because we have seen maize starch (cornflour) and sugar which are nearly pure carbohydrates. If we want to see what a protein is like, we can look at white of egg which is almost a pure protein mixed with water.

Proteins are a part of every living cell. This is true whether we are talking about people or animals or plants. Proteins are therefore essential for life. They can be thought of as the 'building blocks' used to build the cells. They are made up of substances called amino acids which we can think of as the materials used to make the building blocks. Human beings need about 20 different amino acids.

People in different parts of Africa make different kinds of houses, and for this they use different kinds of building materials. Some use mud and straw, other clay with a little cement mixed with it. Yet others make concrete blocks from cement, sand, pebbles, and water. In a similar way, each kind of plant and animal, including human beings, makes the kind of building blocks it needs for each part of its body by combining different amino acids in differing quantities.

Living things, plants as well as animals, make many thousands of kinds of proteins from amino acids, each differing from the others because of the selection of amino acids, the quantity of each amino acid used, and the pattern in which the amino acids are arranged.



People build each part of their homes from different kinds of materials made from a variety of substances. Their houses cannot grow steadily and be completed without the substances which form the building materials being available

People and animals, birds and fish can break down, in their digestive tracts, the proteins from other animals and plants which they have eaten into their original amino acids and reselect and recombine these into new proteins of the kind they themselves require.

If we eat a good diet so that our body has an adequate supply of all the amino acids it needs, then it has no difficulty in making all the various proteins we need for blood, muscle, hair, and the other different tissues of which we are composed. If our food is short of any one or more important amino acid, then we are not able to replace the living cells which make up each tissue and which become worn out continually. All the parts of the body suffer from 'wear-and-tear' just like our clothes and shoes do, and need to be constantly repaired or replaced. Moreover whenever a person, adult or child, receives a burn or cuts his finger, or suffers any other injury, including surgery, or when infections damage parts of our bodies, extra proteins are required to make the cells needed for healing.

As well as being needed for the repair of our body, amino acids are needed for building the proteins for the new cells required for growth. Thus it is more important for children, and for pregnant women to have a good share of protein-rich foods than it is for other adults. Lactating women also need plenty of protein-rich foods so that they can have the amino acids needed to build the proteins in their milk.

If children are short of proteins in their diet, or if they do not have a good combination of proteins so that some of the important amino acids are missing, they will not grow well: they may eventually develop a nutritional deficiency disease called kwashiorkor because their normal body processes break down through lack of the necessary cells to make all their tissues and fluids.

For building cells for different parts of the human being, all 20 amino acids are needed, but our bodies can make more than half of these out of extra quantities of others. There are, however, 9 amino acids which babies cannot make and 8 which even adults cannot make, and these have to be obtained in large enough quantities in our food. These 9 are called

People (like all animals and also plants) build each part of their bodies from building materials, many of them proteins made from a variety of amino acids. Children's growth cannot be steady and complete without the amino acids to make the proteins needed

essential amino acids. Fortunately, foods can help each other out if we eat them at the same meal. For example, maize is short of 2 amino acids but has plenty of others. Beans are short of 2 also but they are different ones from maize. When our body breaks down these foods, it can use the extra amino acids from beans to make good the shortages in maize and the extra amino acids from maize to make good the shortages in beans.

This happens between many different foods. Therefore to be sure that we will not be short of any particular amino acid, it is safest to eat meals which are made from a mixture of different foods, that is a good mixed diet.

Although animal foods have more of the amino acids likely to be in short supply than do vegetable foods, they are frequently expensive and they often contain a high proportion of water which reduces the amount of protein, and therefore of amino acids, which one gets for one's money. We can usually get the same amounts of amino acids more cheaply by combining larger quantities of cereals, perhaps maize or sorghum or rice, with pulses or seeds such as groundnuts, peas, simsim, or soya beans; and we have large amounts of calories in these mixtures as well.

It is, however, important for infants and young children to have some animal protein in the mixtures they eat, as they cannot eat large amounts of cereals and pulses because their stomachs are small. At this age they are growing fast, and the addition of some animal proteins makes sure that they have enough of the necessary amino acids. The mother's breast milk is the best animal food for babies, and continued breast feeding, up to 18 months or 2 years, is the cheapest and safest way of making sure that a young child has the needed amino acids. During and after weaning, some small amounts of animal foods – liver, fish, egg, milk – should be added to their diets if the family can manage this.

Many African families cannot afford to buy much animal food for their older children but these children can, if necessary, get what they need by eating plenty of mixtures of cereals with pulses or seeds and vegetables, especially dark green leaves. However, if it is possible to buy some egg or meat or milk or fish at a price which the family can afford without cutting down quantities, it is advisable to add at least small amounts to all children's diets to increase the variety in the mixture and reduce the possibilities of amino acid shortages. It is more important for growing children to have some animal foods than for their fathers to eat these.

What happens to the extra amino acids which are not used by the body to build human proteins? These are 'burned' for calories just as if they were carbohydrates or fats.

If we do not have the *right mixture* of foods so that there are enough amino acids to build all the body cells, then much of the protein will be burned in this way anyway, instead of being used to build and repair tissues, and growth and repairs will not be possible.

Cereals, pulses, seeds and nuts can be combined to supply the amino acids needed for growth and repair of cells for everyone except infants and young children

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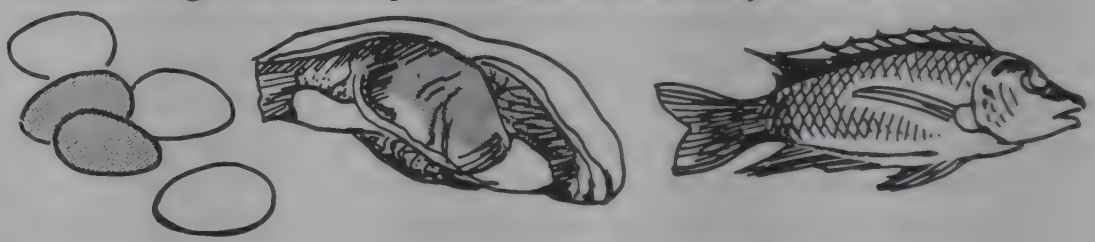
If we are very short of *calories* in our diets, the proteins, even if they supply the right mixtures of amino acids which we require, are burned for the energy needed to live, and are not used for body building. This often happens with young children, and this, rather than a shortage of protein in the diet, is sometimes the main cause of kwashiorkor, a disease in children resulting from protein deficiency (see p. 56).

As protein-rich foods, especially those of animal origin, are usually much more expensive than foods rich in carbohydrate, they are extravagant sources of energy. There is no benefit nutritionally from eating more proteins than our bodies need, and we get better value by 'filling up' with cheaper sources of calories. However, most people enjoy eating animal foods and well-off people usually eat much more of these than they need for good nutrition. There is no harm in this except to the 'pocket', but adults, and even children beyond the pre-school age can be perfectly healthy on a mixture of vegetable foods rich in proteins together with foods high in calories provided that they *eat enough* to give them sufficient energy and that they *mix* at the same meal, cereals, pulses or seeds or nuts, and vegetables to be sure that they have all the amino acids needed for growth and repair available to the body at the same time.



It is safer to add some animal foods to the diet of young children after weaning

A high proportion of animal foods in the diet tastes good and does no harm except to the 'pocket'

What practical ideas about the body's needs for building materials and how to meet them can we discuss with families?

We do not only need energy from food. We also need materials for building all the different parts of the body. The only way we can get these materials for building the body is from food.

We also need materials for repairing our bodies as parts wear out or are damaged. All parts of our body keep wearing out and being renewed, just as our clothes and shoes wear out. We can see that our body is changing when our hair and nails grow long and we cut them and when our skin rubs off and there is new skin underneath; or when we cut ourselves and the cut heals.

Building materials are more important for children than for adults because children have a lot of growing to do. It is impossible to build a child's body without the building materials, just as it is impossible to build a house without the building materials.

Adolescents need more building materials than their parents because they are still growing fast as well as repairing their bodies.

When a person eats food it is broken down by digestion into small particles. Our bodies choose the particles they need for building and repair of muscle, bones, blood, skin, hair, and every other part. Each part of the body is different from the others and needs a different choice of particles.

Plants and animals both use building materials to grow and for repair. So when we eat these we get building materials from them.

Most people like to eat animal foods very much but they are usually expensive

A mother's breast milk is the best food for supplying building materials for the infant and young child as well as the cheapest, most convenient, and cleanest way to give him or her the building materials needed.

When we begin to add other foods to the diet of small children, in addition to breast milk and after weaning, we can give children enough of all the different kinds of particles they need by mixing many different kinds of foods together.

Each food contains different numbers and kinds of particles and children's bodies can choose from the mixture the ones they need.

If only one or two foods are given, some kinds of particles may be missing.

Animal foods such as meat, eggs, fish and milk contain particles which are more like those in human bodies than the particles found in plants.

Therefore, eggs, milk, cheese, meat including liver, kidney, tripe, heart, poultry, fresh and dried fish all give good amounts of the particles needed for building bodies. Most people like to eat these foods very much.

But animal foods are usually expensive to buy, and if we grow them we can usually sell them at a good price to pay for much larger quantities of cereals, pulses, seeds, nuts, roots and vegetables. If our family is short of food this may be the best thing to do, provided we buy a mixture and do not rely largely on starchy roots, or starchy foods like plantain, which do not provide body-building materials.

It is safer, however, for the young children in the family to be given small amounts of animal foods when they are no longer having breast milk, as they cannot eat such large quantities of the vegetable food mixtures as older people and they may be missing some of the materials that they need for their bodies to grow.

Vegetable foods which are especially good for building children's bodies and for repair are:

Best kinds		*Next best kinds*	
soya beans	lentils	millet	wheat
simsim (sesame)	grams	sorghum	teff
groundnuts	coconut and other nuts	maize	barley
bambara groundnuts		rice	oats
peas	melon and pumpkin seeds	dark green leafy vegetables	
beans			

Meals with plenty of relishes, soups or stews, made from mixtures of these good building foods must be given to children, and, if possible, some eggs, meat, milk or fish as well.

For infants and very young children, all foods should be strained or scraped or mashed, and all skins and bones carefully removed.

Remember, a good diet is a mixed diet with plenty of different kinds of foods in it.

A good diet is a mixed diet

3.6 Protein–energy malnutrition[1]

We have mentioned the deficiency disease, marasmus caused by too little food (too few calories), and the one caused by too little protein, kwashiorkor. In reality these deficiencies frequently occur together.

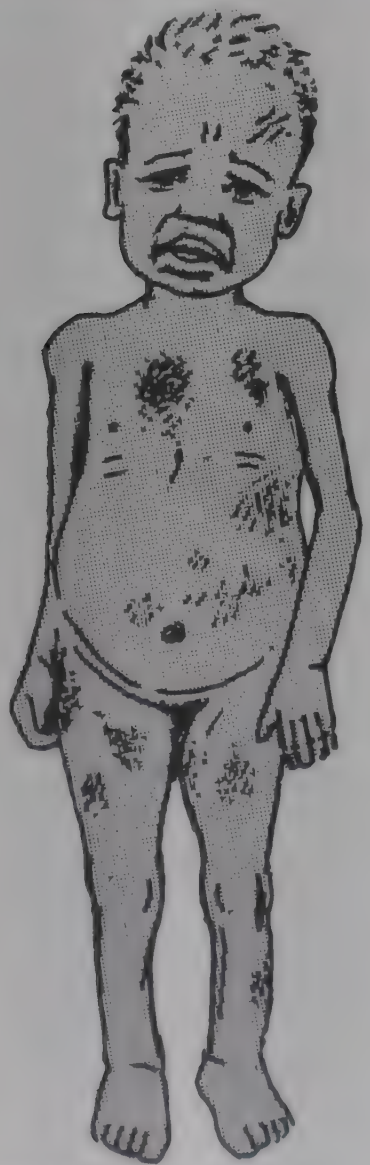
We have said that when there are too few calories the body 'burns' some of the proteins in the diet to produce energy and so creates a shortage of amino acids. This may result from too small a food intake, or from losses through infections, or infestations of parasites such as worms or malaria. Infections increase the body's requirement for energy and for building materials for repair of damaged tissues.

On the other hand, a child developing kwashiorkor usually loses his appetite altogether and so an energy shortage occurs at the same time. This combination of protein and calorie shortage is the commonest type of malnutrition in African children. It is known as protein–energy malnutrition. The form it takes varies from child to child, in some being closer to kwashiorkor, in others the signs and symptoms of marasmus being more clear.

Severe protein–energy malnutrition frequently happens suddenly when a child who is mildly malnourished becomes ill with measles or gastro-enteritis, whooping cough, pneumonia or some other infection. Another reason for the occurrence of protein–energy malnutrition is the sudden displacement of a baby or toddler from his mother's breast, and from his mother's attention and care, because she has become pregnant again. The name kwashiorkor, which comes from Ghana, is thought to mean 'displaced child'. A combination of loss of appetite because of the shock of sudden weaning, with a diet almost wholly of pap, can be the

[1] Protein–energy malnutrition is also known as protein–calorie malnutrition.

A child with marasmus looks like a little old man or woman



Misery is the essence of kwashiorkor

cause of this disease. The disappearance of the traditional social customs which prevented a mother from becoming pregnant until she had nursed her baby for two or more years increases the danger of kwashiorkor occurring.

We should be familiar with the signs of these deficiency diseases so that we can guide mothers. We must persuade parents of suffering children to take them to the clinic or hospital before it is too late to save them.

The signs of marasmus

- The child is very thin and very much underweight for his age.
- There is loose skin on the body, legs and arms; the shapes of bones show, with poor or no muscles.
- There is lack of activity; the child does not want to play or to move about.
- The eyes are sunken and the skin of the face is drawn so that the child looks like a little old man or woman.
- The child gives a low sad whimpering from time to time.

The signs of kwashiorkor[1]

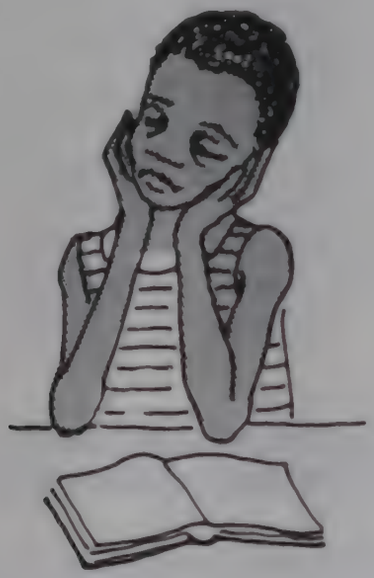
- The child fails to grow and has a small weight-for-age.
- The child suffers from oedema, that is too much water being retained in the body tissues, so that they look swollen. The swelling of the arms, legs, face and abdomen sometimes hides the fact that the child is really underweight; the child may weigh a lot but it is the retained water which adds to the weight.
- There is wasting of muscles, especially round the chest.
- The child cries a lot and is irritable.
- The child is apathetic and absolutely uninterested in anything. By the time the child has reached this stage he is *very* ill.
- The child's hair changes (although this does not always occur). The hair loses its colour and condition, becoming light, thin, straight, soft, and fine and is easily pulled out.
- The skin changes, becoming blotchy, with some parts being darker than normal and some losing colour. Sores and ulcers may develop especially on the buttocks.
- The liver may become enlarged (this is too difficult for a non-medical person to tell).
- There is lack of appetite, vomiting, and diarrhoea.
- Anaemia develops because of lack of the protein needed to build blood cells.
- There is a general appearance of misery.

[1] Not all these signs are present in every child.

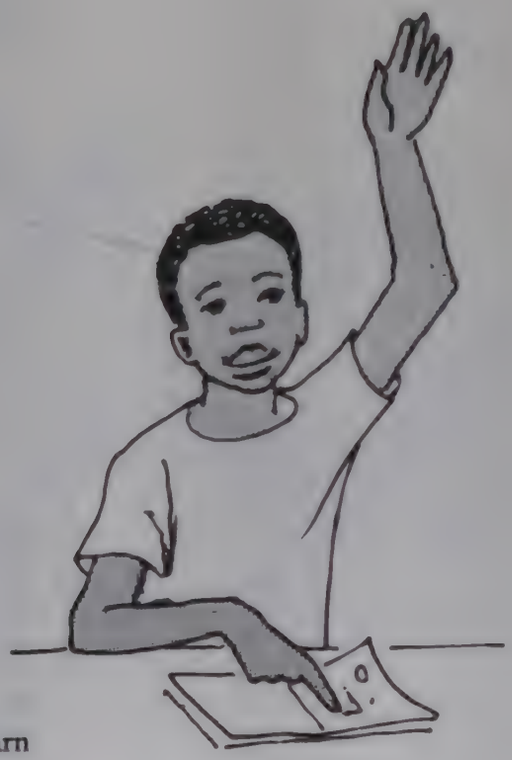
Some of the effects of protein–energy malnutrition form a vicious circle. Because of the deficiency of proteins, the digestive tract does not work well and the children get diarrhoea and vomiting even without an infection. The diarrhoea and vomiting prevent the food they do eat from being absorbed, so the deficiencies become more acute and the digestive tract more damaged.

Protein–energy malnutrition in relation to brain development and learning capacity

It is not possible for us to detect any effects on the brain of an individual child who has suffered from acute kwashiorkor. However, research in recent years suggests that severe malnutrition in early childhood may result in a brain with reduced mental capability. It seems that in such children the ability of the brain to work properly is not always fully regained even when the child has been treated with a good diet for a long period and when all signs and symptoms of protein–energy malnutrition have disappeared. Some research workers conclude that although these deficiencies may not result in serious mental backwardness, the damage



Poorly fed children cannot learn well and are dull in school



Well-fed children are alert and keen to learn

may be enough to limit the children's ability to reach the intelligence which their heredity would have made possible.

Even if we disregard possible consequences of malnutrition on brain development, poor nutrition has a damaging effect on children's learning capacity. As we have noted above, a malnourished child does not have energy to be curious and to run about and observe, listen and ask questions. He is likely to sit listlessly doing nothing. When such a child goes to school he will be at a disadvantage as he will know much less than his friends.

If children in school do not have enough good food they cannot concentrate, and they have no energy to make them anxious to learn or to take part in active projects. These children are often drop-outs from school, not being able to keep up with the class because they do not have enough vigour, even though they may be intelligent.

Great numbers of cases of unsuspected mild undernutrition and malnutrition occur in Africa, especially among children who do not attend child welfare clinics. The evidence of this is the slower and reduced growth commonly found in African children from poor families. It has been shown that African children from privileged, educated and economically well-off families grow as well as privileged children in other parts of the world. Because of this, one can be sure that the reason for slow and limited growth in underprivileged African children is not genetic but malnutrition often linked with infection. It is easy for some incident to turn these underweight children into clinical cases of marasmus or kwashiorkor. It has been estimated that about 70 per cent of pre-school children in some African countries suffer from some degree of malnutrition sometime in their lives, and if only a small proportion have severe protein–energy malnutrition in the first year or two of life, the possibilities of far-reaching consequences in the development of a nation are obvious.

What practical ideas can we discuss with families about preventing protein–energy malnutrition?

If a child does not eat enough food or enough foods rich in building materials, he may:

- stop growing;
- lose weight;
- get a disease called (give the local name for protein–energy malnutrition).

If a mother sees that her child is:

- growing very slowly or not at all and is very small for his age;
- becoming very skinny with the shape of the bones showing and eyes sunken;
- becoming too listless to run around and play and is crying a lot;

or if the child has:

- swollen legs/arms, face or belly;

- weak muscles;
- blotchy skin with parts too dark and parts too pale;
- hair loose and thin and dull and possibly lighter in colour than usual;
- no appetite;
- a look of misery and no interest in anything;

then this sickness is caused by *poor feeding* (possibly combined with some infections). She must take her child *to a clinic or hospital immediately* and *not to the witch doctor*. This disease can only be cured by good feeding.

Sometimes mothers mistake children with this disease for healthy children because they may have swelling which makes them look fat. If any of the other signs given above can be seen, the child is not healthy and should be taken to the hospital or clinic or he/she will probably die.

The best food for building infants' bodies is breast milk from their mothers, and breast feeding should be continued for a long period – up to 2 years old if possible.

Parents who space their children, so that they can give plenty of good food and attention to each baby for 2 or 3 years and can wean them gradually before the next pregnancy starts, are not likely to have children with (local name for protein–energy malnutrition).

As children grow older and are weaned they will not get this disease and will grow well if they have a mixture of different kinds of foods in sufficient amounts.

Children should be given such mixtures, well-cooked and strained to be smooth, by 4–5 months of age, together with the breast milk.

Young children who are well fed with plenty of foods rich in building materials are likely to grow up to be bright and strong.

Do not take the sick child to the witch doctor but to the clinic or hospital

Children who are given plenty to eat, including foods with plenty of building materials, are likely to learn well at school; and the time they spend there and the money spent on uniforms, fees, books, etc., will not be wasted.

3.7 Other nutrients needed

Although protein–energy malnutrition is the commonest type of deficiency disease in Africa, other nutritional deficiency diseases do occur. These are caused by too little of some minerals or vitamins in the diet. *Only if any of these diseases are found in your area* should you teach families about them. If they are not a problem, they should not be mentioned.

The commonest ones are described below.

Anaemia

Our bodies need iron as another building material. Most of the iron in the body is used to make the red part of the blood (haemoglobin). If there is not enough iron in the food we eat, our blood is not red enough and we may get *anaemia*. As it is the red part of the blood which carries the oxygen from the lungs round the body, people with anaemia lack oxygen in the body, including the brain. They become weak, breathless, tired, often have headaches and sometimes cannot think clearly. Their mucous membranes become pale.

Iron is found in good quantities in dark green leafy vegetables, pulses, cereals (unless highly milled, that is white), liver, heart, kidney and eggs. Quite a lot of iron is not available, however, because it is not absorbed in the body from the digestive tract. Vitamin C (see p. 66) found in fresh foods, especially fresh fruit, helps the body to absorb the iron better. A well-varied diet with fresh fruits and vegetables helps to prevent anaemia.

Women need more iron than men because of losses of blood in menstruation and in childbirth.

Babies are born with a supply of iron and they receive a very small amount from breast milk. Their store of iron runs out after about 5 or 6 months and unless babies are given iron-containing foods by that age, they are likely to become anaemic. Children need extra iron because their blood volume is growing larger.

In many children, infestation by worms causes blood loss and leads to anaemia. Anaemia, in pregnancy especially, can also be caused by deficiency of a vitamin called folic acid. The body needs folic acid as well as iron to make blood. Women, especially pregnant women who have lost blood in childbirth, need plenty of folic acid. Among its richest sources are liver, green leafy vegetables and pulses. So pregnant women who eat a varied diet including plenty of green leafy vegetables also get plenty of folic acid.

A varied diet with plenty of fresh fruit and green leafy vegetables helps to build good red blood

What practical ideas can we discuss with families about building good red blood and preventing nutritional anaemia? (Only if there is a problem)

Anaemia is a common problem in Africa, especially among women. It makes them tired, breathless and 'bloodless'. If a person feels like this, she should go to a clinic for her blood to be checked.

Anaemia means that the person's blood is 'thinner' and less red than usual, although we cannot see this with our eyes and it has to be measured by the doctor. This is often caused by not enough iron in the diet. Iron is a building material needed to build good red blood.

Women lose blood in menstruation and childbirth, and pregnant women also lose iron by passing it on to the foetus. So women need more of the building material iron than men do, and anaemia is commoner in women than in men.

Women who have many babies close together do not have a chance to build up their good red blood between pregnancies and they are much more likely to suffer from anaemia than women who space the births of their children wisely. If women have actually become anaemic they need to be given medicine as well as a good diet.

To prevent anaemia, women, especially, must eat the foods which are rich in iron so that they can build good red blood. The foods which give the most iron are dark green leafy vegetables such as leaves from cassava, pumpkin, amaranthus (spinach), sweet potato and many wild dark green leaves. Liver, meat, and eggs, and also peas, beans and home-pounded cereals, which are cheaper, and some fruits, are also rich in iron. It is good to put lots of dark green leaves in stews, soups and relishes. Eating fresh fruit is important as it helps the body to use the iron.

Babies are born with a store of iron which lasts them until they are about 5 months old. When they have used up their store, they also need to be given foods rich in iron so that they can build good red blood. This means that the mixtures they are given, to add to the breast milk, should contain green leafy vegetables and fruits, beans, peas, and if possible some liver or scraped meat or egg yolk, all cooked soft and strained or mashed, and the skins, seeds and other hard parts carefully removed.

All children, until they are fully grown, need extra iron to build the extra blood they need as they grow. For them, a varied diet with plenty of dark green vegetables and fresh fruits is very important, especially for girls.

Not enough sunshine on the skin is the common cause of rickets

Rickets

Our bones and teeth contain a white mineral substance called calcium which we can see if we look at sea-shells or chalk. This substance helps to form much of the hard parts of our bodies. The foetus gets its calcium from the mother and if the mother's diet is not good, the extra calcium needed will be drawn from her bones. The same will happen when breast milk is being made. Although many people believe otherwise, it has been proved that the composition of human milk does not vary much even in malnourished mothers, especially with regard to calcium. It is the malnourished mother who suffers.

After a child is weaned, his diet must contain enough calcium for his bones to grow and to be hard and his teeth to be strong.

Calcium is found in good amounts in milk and cheese, finger millet, teff, pulses, dried or fresh fish when the bones are eaten, sesame seeds (simsim) and dark green leafy vegetables. There is usually enough calcium in most diets for a child's bones to grow well, provided the child also has enough vitamin D which the body needs in order to use the calcium properly.

This vitamin D is largely obtained from the action of sunshine on the fat under our skins. A little is got from butter and egg yolk, and oily fish. Fish livers and fish liver oils, such as cod liver oil, are rich in vitamin D. Lack of vitamin D, especially if the diet is low in calcium, causes *rickets* in children.

In the disease rickets, the bones of a child become softened, so that they bend. Rachitic children commonly have 'knock-knees' or 'bandy' legs. The head, chest, spine and pelvis may also become misshapen, the latter often resulting, in girls, in difficulties of childbirth when they grow up.

Rickets is common in a few African countries where babies are completely swaddled (covered up entirely) to protect them from the sun or the evil eye, or where children are kept indoors to prevent sunburn darkening their skin. The way to prevent rickets is to allow children to play in the sun without many clothes on and to give them a good mixed diet.

What practical ideas about making sure that children have strong bones and teeth can we discuss with families? (Only if there is a problem)

For children to build bones and teeth well they need two things:

- sunshine on their skin;
- breast milk and, after weaning, a good mixed diet containing dark green leafy vegetables, pulses and, if available, dried or fresh small fish, of which the bones are eaten, and some milk.

The sunshine on the skin plus these foods work together to give

children strong bones and good teeth. The sunshine is very important.

If children do not have the sunshine and enough foods to build bones and teeth well, their bones become softer than normal, and the children get the disease called *rickets*. The legs bend in a curve and the chest pokes out in the middle. If a girl gets this disease she may have difficulty in delivering her babies when she grows up as the bones of her body become out of shape. The teeth of such children decay easily.

Mothers can make sure that their children's bones and teeth grow strong by:

- breast-feeding them and by giving them plenty of dark green leafy vegetables and, if possible, whole small fish or some milk. The whole fish can be cooked, dried and pounded to a flour or cooked and mashed for young children; or cooked in the stew or relish for older children;
- letting them play in the sunshine without too many clothes on. This is even more important than diet for preventing rickets and for making sure that the children's bones and teeth grow properly.

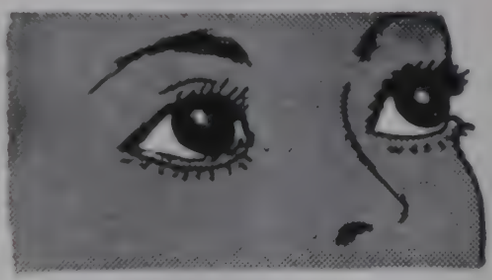
Children who are always covered up do not get enough sunshine and may get rickets

Eye and skin diseases caused by lack of vitamin A

Vitamin A is needed by our bodies for growth and to keep our eyes and skin healthy. It is found in some animal products, chiefly butter, eggs, milk, liver and fish liver oils. However the body is able to make vitamin A from substances called carotenes which are present in dark green leaves of all kinds and in yellow-coloured fruits and vegetables such as mangoes, pawpaws, pumpkin and carrots. Yellow maize has some carotene but white maize has none. Red palm oil, common in West Africa and spreading to other parts of the continent, is very rich in this substance.

Many African people have to rely on dark green leaves and yellow fruits and vegetables for most of their supply of vitamin A. Vitamin A is not likely to be short when plenty of green leafy vegetables, especially the dark green wild ones, can be got the whole year round. In arid regions, a seasonal deficiency of vitamin A is sometimes found. Preservation of vegetables by good methods can prevent this deficiency. Moreover the human body can store vitamin A in the liver for months. This means that if children eat lots of mangoes and pawpaws when these are available they can store up enough to last several months afterwards.

Deficiency of vitamin A leads to softening and ulceration of the cornea (the clear part) of the eye and sometimes to blindness. It usually affects young children and is often combined with kwashiorkor and marasmus. One of the first symptoms of vitamin A deficiency is not being able to see in the dark. Often the skin of a child with not enough vitamin A becomes rough and 'horny', particularly at the back of the arms.



Vitamin A is needed for healthy eyes

Vitamin A deficiency is linked with poverty in slums of cities where people cannot grow their own vegetables, and in rural areas where fresh fruits and vegetables are not available during much of the year because of low rainfall.

The beginning of eye disease from vitamin A deficiency

Blindness from vitamin A deficiency

What practical ideas about preventing eye and skin diseases of malnutrition can we discuss with families? (Only if there is a problem)

Sometimes the eye disease from which children suffer is caused by the lack of a certain substance to be found in foods. Foods such as dark green leafy vegetables like spinach, sweet potato leaves, pumpkin leaves and cassava leaves or wild greens; and yellow fruits and vegetables such as mango, pawpaw, pumpkin and carrots, can prevent this disease, and also milk, eggs, liver, red palm oil, and cod liver oil if these are available.

If a family lives in a very dry area and is not able to have fresh fruits and vegetables during many months of the year, and where dairy foods, liver or palm oil cannot be found or are costly, or if they live in a town where vegetables and fruits are too expensive for them to buy, children may develop difficulty with seeing in the dark and their eyes may become dry and irritable. After this the eye

Green and yellow fruits and vegetables, liver, milk, egg and red palm oil help to keep the eyes healthy

surface may become cloudy and an ulcer may develop which will make them blind. The lack of these foods may also show on the skin at the back of the arms, which becomes rough with little hard knobs on each of the pores.

To prevent children getting this disease, mothers who live in dry areas, or in towns where vegetables and fruits are difficult to buy during the scarce seasons should:

- dry plenty of dark green leafy vegetables in the seasons when these are abundant and cheap, for use in the months when fresh vegetables are not to be had;
- give children red palm oil (if available) in sauces, relishes or soups;
- give children some milk or egg or liver if this is possible.

Disease caused by lack of the B vitamins

The B vitamins are a group of vitamins which are mostly involved in the steps for producing energy in the body. However, folic acid, already mentioned in connection with anaemia in pregnant women, is a B vitamin. The various B vitamins are quite different substances but they tend to be found in the same foods and so were originally thought to be one substance. The richest sources are cereals (when brown, that is roughly milled or home-pounded or whole grain), pulses and green vegetables. Fish, eggs, milk, and meat also contain useful amounts of several of these vitamins. As B vitamins are fairly widespread, people eating a mixed diet based on cereals, pulses and vegetables are not likely to be deficient, provided the cereals are not highly milled. Nevertheless we have to be careful in Africa about the following B vitamins because in some places lack of one or other of them prevents proper child growth and may even lead to various deficiency diseases.

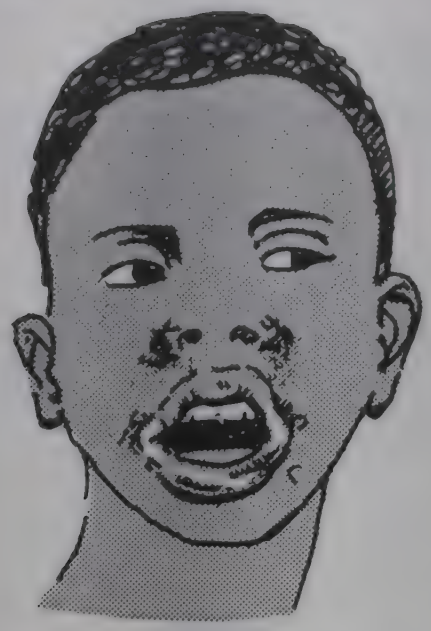
Niacin

This B vitamin is needed to prevent pellagra. People suffering from pellagra are usually poorly nourished generally. The symptoms of the disease are loss of weight, skin which becomes dry and cracked, especially the parts of the skin like the face and hands which are not covered by clothing, diarrhoea, and eventually, mental disturbances. Often the mouth and tongue are red and sore. Dermatitis, diarrhoea, dementia – three Ds – form the classic description of severe pellagra.

Pellagra is found mostly in countries where maize is the staple food because the niacin in maize is not well used by the body. A good mixed diet prevents pellagra. In areas where pellagra is common, mothers should be encouraged to give their children groundnuts and other pulses, vegetables, and when possible some milk, egg, or meat.

We need not teach families about pellagra unless the disease is a problem in the area.

Pellagra is usually found when people eat very little except maize



A red tongue and sores at the corners of the mouth and nose can be a dietary deficiency

Riboflavin

This B vitamin is usually found in foods which are rich in proteins. A deficiency therefore may often be found in people with too little protein in the diet. Its symptoms are a cracked and red tongue, cracked lips and sores at the corners of the mouth and nose.

Again, while we ourselves need to know that these signs are probably of a nutritional deficiency we need not teach about them unless they are a common problem.

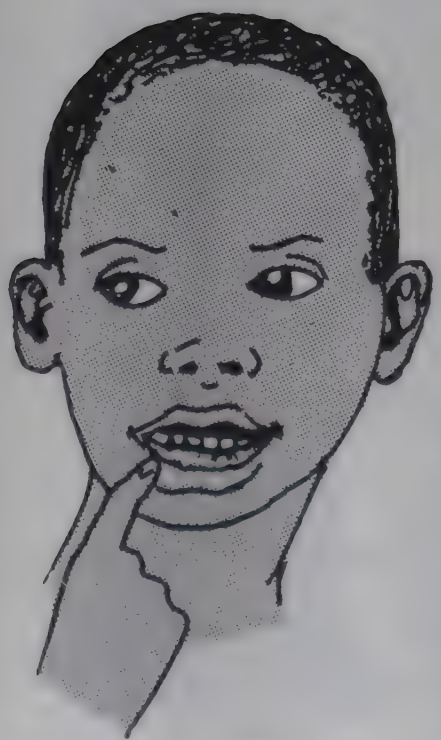
A disease caused by lack of vitamin C

Vitamin C, or ascorbic acid, is needed to prevent scurvy. Scurvy is a disease in which the walls of the small blood vessels break down and the blood seeps out causing spots like bruises. Often the gums bleed and the teeth become loose. This deficiency can occur in arid regions when drought prevents fresh foods from growing, but it is not at all common. The disease can be prevented by eating fresh fruits and vegetables. However, vitamin C is lost by too much cooking of vegetables, and by throwing away cooking water into which the vitamin has dissolved, so short cooking times and the use of cooking water in soups or stews are important.

If no fruits and vegetables are available in drought areas, it is possible for health services to distribute pills containing this vitamin, and these are not expensive and are safe. This would, however, be an emergency measure.

Scurvy sometimes occurs in old people, or among men who cook for themselves, when these groups do not bother to eat any fresh foods.

We need only teach about this disease if it is common in an arid region where we work. However, it is important to have plenty of vitamin C in the diet because it helps the body to use the iron found in many foods and it is needed for healing wounds. So eating fresh fruit is especially important. In Africa, fresh fruit is often considered a snack rather than a meal food and we can stress its importance in a good mixed diet.



Bleeding gums and loose teeth can be caused by malnutrition

3.8 How food is digested

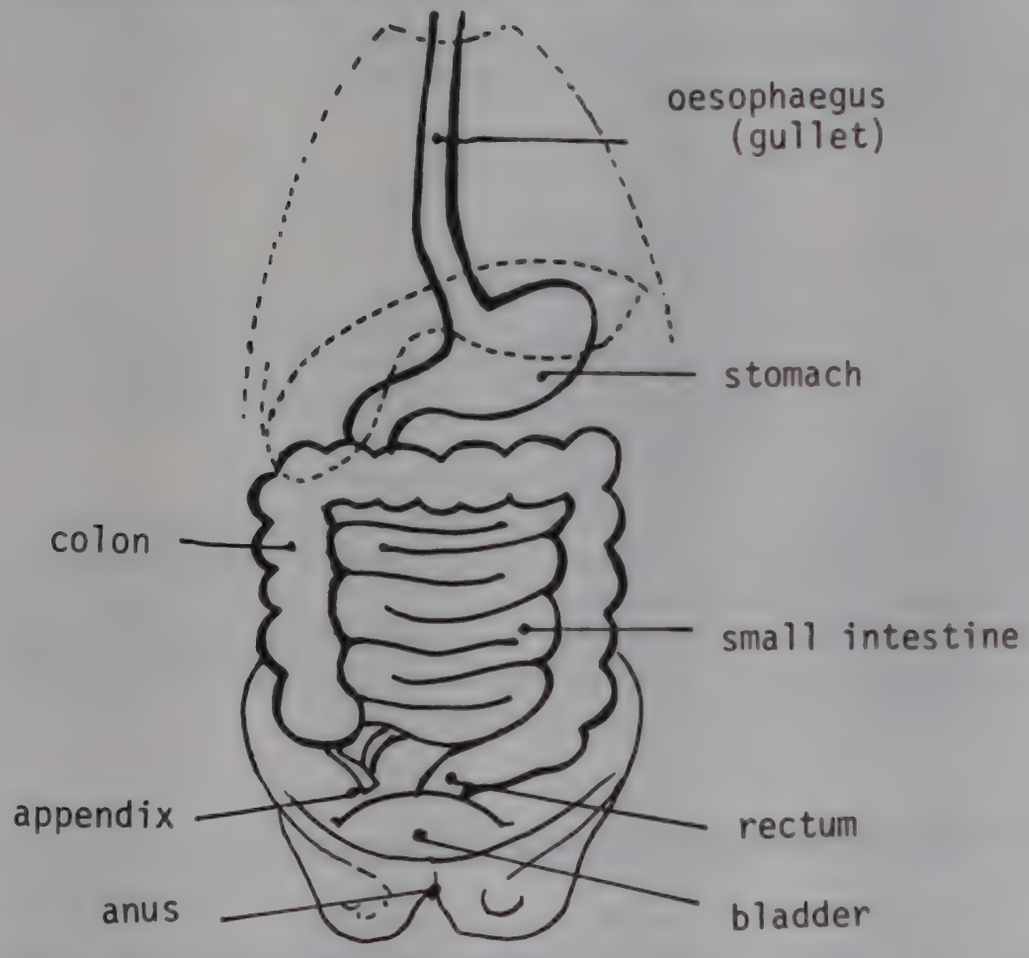
Good nutrition depends not only on a good diet but also on good digestion to make the nutrients available in our bodies.

Foods are complicated chemical combinations, and before we can absorb them from our stomachs and intestines, they have to be broken down into simple small particles which are soluble and which can pass through the walls of our digestive tract and so enter our body's tissues. They have to enter our tissues before they can be used for energy, building, maintenance, and regulation. This breaking down process is called digestion.

Digestion consists of two types of action:

- The physical breaking down by chewing and by the action of the walls of the stomach and intestines. These are made of strong muscles and they move the food around. This movement gradually helps to break the food up and passes it down through the digestive tract. We can control the chewing and passing of stools out from the rectum using a muscle called the anus, but the rest of the process is involuntary, and we have no control over it.
- The breaking down by chemical action. This takes place all along the passage of the food from mouth to rectum. This chemical action is assisted by digestive juices containing salts and substances (enzymes) which help to speed up the processes but are not themselves changed. Different enzymes help with the digestion of carbohydrates, proteins, and fats.

Our digestive tract looks something like the figure below.



The food enters the mouth and passes into the throat and down the gullet (oesophagus) into the stomach. After it has been churned about and some of it broken down into simpler parts, it passes into the small and then the large intestine, and finally out from the rectum. Its progress is regulated by special muscles which open and shut the passages from one part to another when the food is at the right stage for moving on. Most of the broken-down small soluble particles pass into our body proper from the walls of the small intestine.

The residue of indigestible parts of the food, together with quite a lot of water, passes into the large intestine and here excess water is removed, leaving the stools of a consistency for easy defaecation (bowel movement). The frequency of passing stools varies with age and with the diet people eat. For adults, one person may pass stools twice a day and another every 2 or 3 days; both are perfectly normal. The consumption of a meal stimulates the passing of food down the digestive tract and the excretion of the residue.

Constipation

This usually begins because the desire to pass stools is constantly ignored and the natural bowel habit is lost. The faeces become hard because too much water is absorbed from them, and they distend the rectum and bowel and block the passage. It is important to develop regular bowel habits, whatever the interval. Taking medicines for constipation irritates the bowel and prevents good regular habits from being established normally.

Diarrhoea

This is the effect of too much water in the stools, which become fluid. It is the result of too rapid passage of food through the digestive tract with not enough time for food to be digested or for the water to be absorbed from the large intestine.

The causes of this rapid passage of food are commonly:

- inflammation of the digestive tract due to infection (dangerous);
- irritation from unaccustomed foods, usually in small children (not dangerous but worrying);
- abnormal lining of the walls of the digestive tract (especially important as it happens in children with kwashiorkor and causes recurring diarrhoea which makes their nutrition worse).

Cooking, digestion and nutrient loss

Cooking helps to destroy germs and worms and thus makes food safer. It also makes some foods easier to digest. Many foods, in particular cereals, starchy roots, and pulses, cannot be easily digested by humans unless they are cooked to burst the starch cells.

Many vitamins and minerals are soluble in water and they are dissolved out of the food into the liquid in which food is cooked. If this liquid is not consumed, valuable nutrients are lost. Cooking liquid should always, therefore, be added to soups, stews and relishes.

Long cooking also destroys some vitamins, especially in fruits and vegetables. It is important therefore, when fruits and vegetables are being

cooked, that they are put into already boiling water and boiled for the shortest possible time. In making soups, stews, and relishes, the vegetables can be added towards the end of the cooking. Green leaves (except for cassava leaves) only need a few minutes to cook well.

Cook green vegetables for 5 – 10 minutes only to preserve their food value. Use only a very little water and add this, after cooking, to the soup or stew

What practical ideas about digestion can we discuss with families?

Food has to be digested well before our bodies can use it properly.

Food for babies and young children should be carefully cooked and strained or scraped or mashed and all the rough parts, skins and seeds removed because young children cannot digest these.

Babies cannot digest much fat so they should not be given fried or very fatty foods.

Children should be trained in regular bowel habits.

Adults should not use laxatives regularly or the natural bowel habits will be lost.

If a child gets slight diarrhoea this may be because he has been given an unaccustomed food. New foods should be added first in very small quantities ($\frac{1}{2}$–1 teaspoonful) and gradually increased, so that the child's digestive system becomes accustomed to the food gradually.

Most diarrhoea is caused by germs in the food. Cleanliness of food for babies and young children is essential (see next section).

Cooked foods are safer for babies than raw ones as cooking destroys germs. However, some fresh fruit juice, or fruit peeled, mashed and strained to get rid of seeds and rough pieces, is good for babies.

Vegetables, especially green leaves (except cassava leaves) should be cooked only for a short time to preserve their good food value.

Liquid in which vegetables are cooked should be added to the soup, stew or relish.

Even young babies can eat meat if it is scraped before cooking

Immunization can, for example, protect a child against whooping cough

3.9 Prevention of infections

We have already considered (p. 32) the dangers of infections in young children who are even slightly malnourished. The combination of infections with malnutrition is the cause of a high proportion of infant and pre-school deaths in Africa.

An infection may have a severe effect on a child's nutrition. Alternatively, poor nutrition may reduce a child's ability to recover easily from infections. In other words, when malnutrition and infections occur together, each is likely to make the other more serious and they add up to a much more dangerous illness than we would expect from the seriousness of either alone. Thus malnourished children in Africa frequently die if they get measles, whooping cough, pneumonia, or gastro-enteritis, while well-fed children are rarely dangerously ill with these diseases. In the other direction, an acute infection such as measles or diarrhoea can tip a mildly malnourished child into an acute disease of malnutrition, as the

infection raises the child's requirements for food, in particular for proteins to repair tissues and for some minerals and vitamins. Some infections, moreover, prevent children from digesting food well, and from absorbing it into the body, so that even if their diet is adequate they cannot use the food properly; while infestation by worms of various kinds can use up the food the children eat and need for good growth.

Statistics in African countries frequently record the causes of children's deaths as measles, or diarrhoea and vomiting, or pneumonia, when in reality the real killer is the malnutrition with which the infection is combined. To reduce some of the causes of severe sickness and deaths in young children, therefore, it is necessary to approach the problem from two directions and to cut down the chances of infections while, at the same time, making sure that children are well fed.

Ways of reducing the chances infection are described below.

Immunization

This means to prevent children getting a disease or if they get it to make sure that the attack will not be serious. Children may be slightly ill after immunization but the illness is not important and soon goes away. Children can be protected by inoculation or vaccination from many infectious diseases especially diphtheria, whooping cough, tetanus, smallpox, poliomyelitis, tuberculosis, and measles. They can be protected from malaria by anti-malarial medicines. Families should be encouraged to take their children to clinics or dispensaries for these immunizations, and to take them regularly, as well, for check-ups even if the children are not ill.

Good hygiene

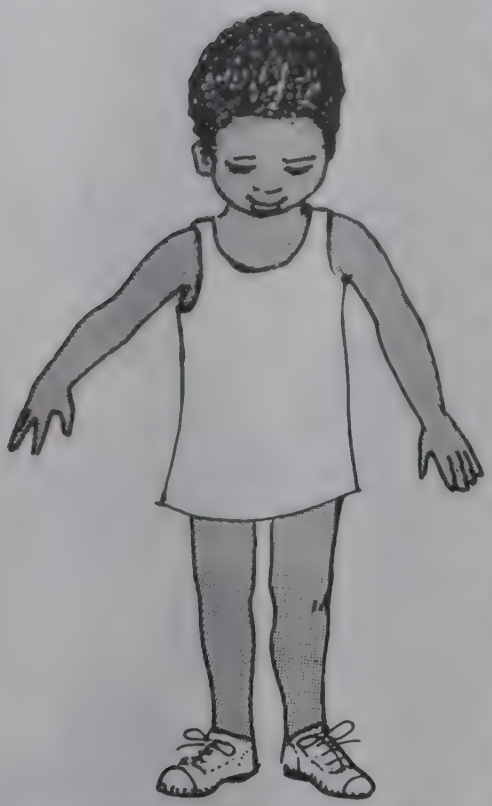
Strict attention to cleanliness can reduce the chances of infections. Diarrhoea and vomiting, and most infestations by worms, are the result of dirty houses and compounds, contamination of foods and dishes by dirty hands, infected water, lack of latrines, poor personal hygiene and by the transmission of diseases by flies, cockroaches, bugs and rats.

Some worms may also be transmitted by undercooked meat and fish; some kinds of tuberculosis can arise from children being given milk from infected cows, which has not been boiled.

Hookworms can enter a person through the skin, usually the feet. To prevent children being infected everyone must use a latrine and carefully wash their hands afterwards. It is essential to keep the house and compounds very clean. Children should wear shoes or sandals if at all possible.

Bilharzia is caused by small 'worms' which leave the human in the faeces and enter into tiny snails which grow at the edges of infected lakes and streams. If an infected person uses the area near a stream or lake

The clinic staff can immunize children against many infectious diseases



Shoes help to protect a child against some infections and infestations

shore or other water as a toilet, the snails become infected and other people who go to the same place are infected from the snails. The way many people catch bilharzia is by bathing or doing laundry in infected rivers or lakes.

Bilharzia can be prevented by building and using latrines, and by collecting water for washing and bathing and letting it stand for 24 hours before it is used. This destroys the tiny 'worms' which cause bilharzia; also wearing shoes or sandals is some protection.

Making sure that children are well fed

As we have stressed above, well-nourished people, especially children, can usually overcome infections and grow well again quickly. They can be helped to do this by giving them a good diet while they are sick, as they need extra food to rebuild the tissues of their bodies which have been weakened and destroyed by the illness.

Most people suffering from an infection lose their appetite, and many have sore mouths or throats, and these conditions make it difficult to persuade them to eat. Often, also, it may be the custom to reduce the food given to a person who has diarrhoea, or to give nothing to eat at all. It is very important, however, to encourage mothers to feed children who are suffering from infections, including diarrhoea, in spite of these difficulties. Sick children should never be starved.

Breast-fed children should continue to be given the breast. Breast milk does not give children diarrhoea although many people believe that it does. Breast milk is the best food for young children who are sick as it provides plenty of body-building proteins to repair the damage done by the illness.

Strict attention to cleanliness can reduce the chances of infection

Older children should be given soft foods, such as porridges with egg or milk, or soft bread and milk, or rice cooked soft or mashed potato, which are easy to swallow as well as nourishing. Powdered milk can be added to the rice or potato. Cooked and strained fruits and vegetables, especially yellow ones such as pawpaw and mango, tomatoes and carrots give extra vitamins needed to heal the linings of the mouth and digestive tract.

Children with infections lose water, through their stools in diarrhoea, because they may vomit and because they often have fever. It is important to replace this water before the child becomes dangerously dehydrated (too little water in the body tissues). Sick children should be given plenty to drink.

If a child has diarrhoea, he/she should be given cool boiled water with a good pinch of salt and 2 teaspoonfuls of sugar in the cup. The drink should not taste saltier than tears which have the amount of saltiness normal in the human body. This mixture helps the body to keep the liquid in the tissues. If the diarrhoea is severe, the child should be taken to a hospital or clinic as quickly as possible as the water may have to be replaced by using a drip into a vein, and this can only be done by health staff.

If children lose too much water, they may die of dehydration before they die of malnutrition.

A clean compound and a clean house help to protect children

What practical ideas about how to prevent infections can we discuss with families?

Children who are not well fed can become very sick if they get an infection such as diarrhoea and vomiting, measles, whooping cough, or malaria. They are much more likely to die than well-fed children.

Many infections can be prevented by immunization at the clinic or dispensary.

Immunization (to make immune) means to protect children from getting a disease, or, if they get the disease, to make sure that they are only slightly ill.

Immunization is done for different diseases in different ways – it may be an injection, a scratch on the skin or some drops of medicine.

A child may be sick after the immunization but this sickness is not serious and it goes away very soon. It is well worth children having this slight sickness to prevent the possibility of them getting the disease and being very ill and possibly dying.

By immunization, children can be protected from (use local names):

diphtheria	tetanus	tuberculosis	measles
whooping cough	smallpox	poliomyelitis	cholera

They can also be protected from malaria, by using anti-malaria medicines regularly.

There are some infections from which it is not possible to immunize children, and other means have to be taken to protect them. These diseases include diarrhoea and vomiting, worms, and bilharzia. For these a mother must:

- try to prevent her children from being infected;
- see that they are well fed, so if they become infected they have the resistance to live and get well instead of dying;
- be sure that infants are breast fed. Breast milk does not cause infections but dirty feeding bottles often do.

Diarrhoea and vomiting are caused by germs from dirty foods, dirty dishes, dirty house and compound, dirty drinking water or milk which has not been boiled, and often, by dirty feeding bottles.

It is not always possible to see the dirt and it is never possible to see the germs because they are so small. But small as they are, they can make a person, especially a child, so sick that he/she dies. The germs are carried by flies, cockroaches, bugs, rats, which live where there is dirt; by people who do not wash their hands after going to the latrine; by coughs and sneezes on food; and by dust blown from a dirty house or compound.

To prevent diarrhoea and vomiting, members of the family must:

- wash the hands thoroughly with soap before preparing food and eating;
- never use a feeding bottle for babies and toddlers. Extra food or liquid, in addition to breast milk, can be given with a cup and spoon;
- wash all the dishes for the baby and young children very well in very hot water. If possible, boil the baby's dishes after they are washed;
- keep the house and surroundings very clean and free from rubbish which would provide a breeding place for flies, mosquitoes and rats;
- keep the house airy and put the bedding in the fresh air regularly;
- boil all drinking water; if a child is given milk, boil this also, and

keep the containers holding boiled water or milk covered to protect them from insects and dust;

- cover all foods and drinking water to keep them free from flies and dust;
- build a latrine and make sure that everyone uses it. If no space is available, a community latrine can be built on a self-help basis;
- teach children to use a latrine of suitable size instead of the compound;
- see that everyone in the household washes his hands after going to the latrine;
- bath the baby and the children every day and wash their clothes regularly;
- if babies or toddlers are eating something in their hands see that they are on a clean mat in case they drop the food and then pick it up and put it in their mouths;
- never give a baby or young child left-over food which has been uncovered and which may have been spoiled or infected by flies;
- never give a baby large amounts of a new food as this can cause diarrhoea and vomiting because of indigestion. Start with half a teaspoonful at a time;
- protect children from worms, also, by cleanliness of food, person, house, compound and by the use of a latrine.

Boil the drinking water and keep it clean

If children begin to have diarrhoea or to vomit, give them, as quickly as possible, a drink of boiled cool water in which 2 teaspoonfuls of sugar and a good pinch of salt have been dissolved. This drink, which should not taste saltier than tears, will help prevent them losing too much water from the body. It is loss of water that is often the immediate cause of a child with diarrhoea dying, like a person dies of thirst.

Take the child with an infection to the doctor, clinic, dispensary or hospital immediately.

Keep breast feeding sick children — do not put them on a bottle. Breast milk does not cause diseases. Keep giving the child plenty of sugar–salt water.

If sick children have been weaned, or are already eating other food as well as breast milk, give them light foods such as porridge with egg or milk or rice, mashed potato or bread with milk. *Do not starve them.* Dried milk powder can be added to the porridge or rice or potato if it is available.

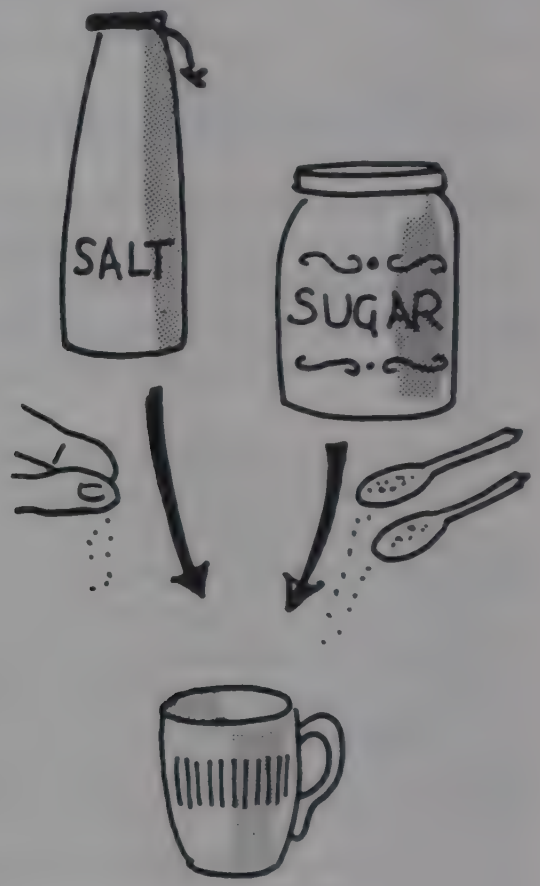
Hookworm and bilharzia are caused by worms, which enter the body through skin, usually the feet. Therefore try to buy shoes or sandals for each child to prevent worms entering the body. Do not bathe or wash clothes or allow children to bathe in water which is infected by bilharzia.

Malaria is caused by mosquitoes which breed in water. Therefore cut all grass short and pull out weeds in the compound which might hold or shelter drops of water. Never allow water to stand in pools

or in old tins or broken dishes. Standing water gives a place for malarial mosquitoes to breed.

Remember that cleanliness helps to keep children healthy.

Mothers should take their children to the clinic, dispensary, or hospital if they seem ill or if there are any signs of infection or worms. Most worms are easy to get rid of.



A child with diarrhoea should be given clean cool boiled water with a pinch of salt and 2 teaspoons of sugar added

4 FEEDING THE FAMILY

The parents should plan the food crops they will need to grow to make sure the family is well fed, and to have some surplus to sell if possible

We have looked at the nutrients which the human body needs for good health, growth and development, at what happens if the diet does not contain these nutrients, and at some ways of making sure that people's needs for nutrients are met. Now, in summary, we can consider how families can be certain that all their members are properly fed. One of our jobs, as educators concerned with family welfare, is to interpret the science of nutrition into simple guidelines which people can understand easily and follow.

Some of the principles outlined below have already been mentioned when discussing the body's needs for various nutrients. This section of the manual endeavours to bring together the most important points to remember when assisting families to choose, prepare and eat foods which will help their members to achieve good health.

4.1 The family diet

It has been said that a good diet is a mixed diet. The best way of making sure that a family does not lack the necessary foods for health is for it to plan ahead what foods will be needed to feed the family well, between harvests or between pay periods.

In most parts of Africa, it is the women of the family who grow the food as well as preserve, store, prepare and cook it. Nevertheless, it is often the men who 'hold the purse strings' and so fathers as well as mothers need to know about good nutrition and the food needs of the different family members.

Parents should budget for what will be needed to provide meals with not only enough of the basic cereals and starchy foods but also plenty of nourishing soups, stews and relishes. The kinds of foods which will be used for these latter will depend on the wealth or poverty of each family, but a knowledge of how to get the best nutritional value for money will help everyone.

Farm families can calculate how much of different foods will be needed during each period of the year and can plant enough of the varieties of cereals, roots, pulses, seeds and vegetables to have sufficient for home use all the time, as well as some items to sell if possible. It is common in Africa for farmers to sell much of their new crops to buy consumer goods such as bicycles, radios, and new dresses, or to pay debts incurred by purchasing

In many parts of Africa, families can catch fish to improve their diets. Young children should be given a generous share

these. Often they have to buy back food before the next harvest at several times the price they originally received when harvests were just in and there was an abundance of food on the market. While such items as bicycles and radios are important for transport and education, the priority must be to have enough food for family health. Without this, the other goods cannot be enjoyed.

It seems obviously much more sensible to keep enough food than to have to pay high prices to buy it back. This is only true, however, if the crops can be well stored with very little loss from insects, moulds, and rodents. This means that unless families already use excellent storage methods, as happens in some African societies, they must be given the opportunity of learning better ways.

City families also need to budget their resources to make sure that they are properly fed. Unless families are rich, the greatest part of an urban family's money in every society has to be used for food if all the members are to be well nourished and healthy.

It usually costs much less to buy large quantities of dry foods such as cereals or pulses at one time than to buy small quantities every day. A housewife can buy in bulk provided she has budgeted for the cost and can store the foods well.

Women can often find fruits and vegetables cheap in the market when it is the season of plenty after the rains. If they learn how to sun-dry foods properly, they can buy large quantities of fresh foods comparatively cheaply and preserve and store them for use in the expensive season of scarcity. Dried foods are handy for making children's and families' meals (see p. 91).

Good family methods of drying and storing foods are described in other publications of the ECA Africa Training and Research Centre for Women and of the UNICEF Regional Office, Nairobi.

If families can afford to buy, or can produce economically, some animal foods such as milk, eggs and meat, (including the meat of small animals such as rabbits or guinea pigs), poultry, and fish, they should make sure that a generous share of these foods is given to the children who need extra for growth. Meat of all kinds and fish can also be sun-dried. They should be cut up into thin pieces if large, and soaked in salt solution to draw out some of the water from the flesh (osmosis).

It has been emphasized (p. 45) that if a family is poor and prices are high, it is often better to concentrate on getting enough of a good mixture of foods of vegetable origin than to cut down the quantity in order to buy expensive animal foods or imported baby foods. To have enough is the first consideration, as much of the animal proteins will be used for energy and not for body building if the diet is short on calories.

Foods like groundnuts, soya beans, peas, beans and lentils, simsim and coconut and cereals, which have both a high calorie and a high protein value, can be combined with roots, or starchy fruits and with green leafy vegetables. Meals made from mixtures of these foods are nutritious, and cheaper than eggs and meat for families which cannot afford to spend much. It is, as has been pointed out earlier, important to give weaned

toddlers and pre-school children some animal foods if this is at all possible to be sure that they have all the amino acids that they need for growth (see p. 51).

Individually, pulses, seeds or nuts, and cereals do not have such good patterns of amino acids per gram of protein as animal foods. However, as much, or more, of the essential amino acids can usually be got from them for a given amount of money spent, because of their high protein content and cheaper cost. In addition, more calories are obtained. If these different foods of vegetable origin are combined together (see p. 51) the body has the chance of selecting all the amino acids it needs. While it is desirable and palatable to have some animal foods in the family diet, older children and adults can manage to get the energy and nutrients they need from a good mixture of cereals, pulses, nuts and starchy foods *provided they eat enough.*

High work productivity, and therefore development, depends on a well-fed population

The next section of this manual deals with what we call the vulnerable groups, such as children who need extra building foods because they are growing, and pregnant and lactating women because they are supplying the foetus with nourishment or making milk. However we must remember that everyone, including men, and women who are not pregnant or lactating, need much more food if they are working hard than if they are sitting at a desk or doing light work. Work cannot be done without enough energy taken in as food, and productivity depends on having a good diet.

What practical ideas about getting the best food possible for everyone can we discuss with families?

The best way to make sure that the family has enough nourishing food is to plan and budget ahead.

Farm families should work out how much food they will need between harvests and should plan their crops to make sure that they grow enough food of different kinds to feed the family, and if possible some to sell.

It is less costly to keep enough food for the family throughout the year than to sell much of the crops and have to buy back food at higher cost later in the year, always provided that the food can be preserved and stored well and losses do not occur.

Good storage and preservation methods are essential if the crops are to be kept for family use. The agricultural extension officer and home economics officer can usually advise on how to store the different foods.

Good food is necessary for good health, and good health is more important than owning many material things; good health allows people to work hard and eventually have money to buy the material things they need.

Town families can save money by buying dry foods in bulk, provided they store them well. Foods bought in larger quantities are usually cheaper per pound or kilo than foods bought in small quantities.

Sweets and fizzy drinks cost a lot of money and are not good for nutrition. They damage children's teeth.

Buying and preserving fresh foods in the season of plenty can save money and help to give variety in meals throughout the year.

If a family cannot afford a diet with lots of animal foods like eggs, meat and milk, they can, with the exception of the very young children, still have plenty of energy and the nutrients they need for health and growth by combining pulses, seeds, cereals, and vegetables, especially green leafy vegetables.

It is better to have plenty of these than not enough of more expensive foods. Families should try, however, to give some animal foods to the very young children. They need animal foods more

Town families can buy dry foods in bulk to save money

than men need them because they are growing fast. Human breast milk helps to keep children up to 2 years old safe and growing normally.

People need larger quantities of food if they are working hard physically. Too little food makes people weak, and prevents them from doing their work well. This in turn restricts the amount of food they can grow or the amount of goods they can produce, and brings poverty to many families. It prevents the real development of the community and the nation.

4.2 Food needs of the most 'vulnerable' people in the family

Pregnant and nursing women, and children, are called the most 'vulnerable' groups because they need greater amounts of proteins, minerals, and vitamins than other people. They are therefore more likely to become malnourished if the family diet is inadequate, or if the food is distributed badly among the family members. Often these groups are not well fed in African societies, not only because of poverty, but because of traditional feeding patterns and restrictions, and even because of modern changes such as the stopping of breast feeding. It is therefore important to consider the special needs of these groups when thinking about food for the family.

Pregnant women

Pregnant women must eat more than normally, especially in the second half of pregnancy, in order to supply the energy and nutrients needed by the foetus growing in their wombs (see p. 41).

Their need for foods rich in building materials is much greater than that of their husbands. We have said that eggs, milk, meat, especially liver, and fish are all excellent 'building' foods if families can afford them, but that meals made with mixtures of beans, peas, groundnuts, sesame (simsim), melon seeds or nuts, with millet, sorghum, rice, maize, wheat or teff, taken with dark green leafy vegetables are also good sources of proteins, since the amino acids in these different foods help each other out (see p. 51). Pregnant women should eat plenty of soups, stews or relishes made from such mixtures. There is rarely any traditional restriction on a woman eating as much of these foods as she wants.

The addition of dark green leaves to the diet of pregnant women is very important as it helps to prevent them from becoming anaemic (see p. 60). Some green leaves, especially cassava leaves, also give useful amounts of good proteins.

If a pregnant woman becomes too heavy, this is a danger to her health. Her heart has to work harder, her feet may swell, and the veins in her legs may become enlarged. She may have difficulty in delivering her baby.

This is not likely to happen among rural farm women who work almost up to the time that they are delivering. It can, however, happen in cities where women may have little chance of exercise or may stop work during pregnancy. If a woman is putting on weight too fast, she should not eat much sugar and should reduce the amounts of food that she eats, especially of starchy food, such as yams, cassava or plantain, which give calories but almost no building materials.

As soon as a woman knows that she is pregnant she should go to the clinic or health centre or dispensary for her health to be checked. If anything is wrong, it should be put right early. A pregnant woman should not use medicines or purgatives unless she has been given them by the doctor or nurse. She should follow the advice of the doctor or nurse at the clinic. The surest way to have a healthy baby is for the mother to be healthy before her child is born.

Although it is difficult for a busy mother to rest, a pregnant woman must try to get some rest every day and she should not do very heavy work or carry very heavy loads.

She must clean herself before delivery, and the house and compound should be very clean. Simple clothing and bathing arrangements should be ready before the baby is delivered.

The knife the midwife uses for cutting the cord must be boiled. Mud or dung must *never* be put on the wound. This brings infection, especially tetanus.

Babies should be put to the breast straight after delivery. If, as occasionally happens, they will not suckle, wetting the inside of the mouth with a little clean water may start them off.

The mother should take the baby to the clinic as soon as she is well enough to do so.

Frequent pregnancies and too short intervals between pregnancies cause danger to the health of mother and child. A gap of about 3 years between births helps to make childbearing much safer. It allows the mother to become well nourished again and makes it possible for her to breast feed and care for one baby before its place is taken by another. As we have discussed earlier (p. 17), pregnancies in teenage girls and in women over 35 years of age are dangerous for mother and child health.

Lactating mothers

Lactating mothers also need extra food if they are to have enough milk for their children and not use up the nutrients in their bodies to produce the milk.

Fortunately, in rural societies in Africa, most women lactate as a normal part of life and as a natural experience which gives both mother and child pleasure.

It is largely in cities and towns that high-pressure advertising, increased wage employment of women, and the desire to become part of 'modern' society are leading to a greater use of artificial imported milk

preparations. These are expensive and must be prepared in a hygienic way which takes time, trouble and fuel. Unfortunately, in many places, the change from breast to bottle feeding is now spreading to rural villages where a variety of imported baby foods can be found in the small rural shops.

Although it may not be dangerous for well-off city women with modern kitchens to substitute bottle for breast feeding, the position in many rural homes is very different. The difficulties of keeping the formula and the bottle clean in rural conditions are formidable. We compare the advantages of breast milk and the disadvantages of bottle feeding, below.

Human breast milk is nature's food for human babies

Human breast milk

Human milk is the best food for infants because:

- it is the baby's natural food and has the right nutrients for the baby to grow well and be healthy;
- it has everything a child needs from food for the first 4–5 months of his life;
- it is always ready and at the right temperature;
- it is always clean; it never sours or spoils even if the mother is pregnant again;
- it is less expensive than buying milk or baby foods;
- suckling from the breast contributes to a baby's security;
- the baby can suckle during the night while the mother is asleep; this helps the flow of breast milk and fulfills the baby's need for food;
- a breast-fed child rarely becomes too fat for health;
- breast-fed children rarely get diarrhoea;
- the colostrum, that is the yellowish sticky milk which comes from the mother's breasts during the first 10 days or so after the baby is born, is very good for the baby as it is richer in nutrients than the white breast milk which comes later; it contains substances which help to protect babies from diseases in the first few months of life.

Bottle-feeding

Bottle-feeding is dangerous because:

- imported commercial powdered milks, and sometimes even fresh milk, are often so expensive that mothers frequently thin them down to make them last, and so underfeed their babies;
- germs grow in the milk, especially inside feeding bottles, and make babies sick;
- milk bottles and teats are very difficult to clean so they nearly always hold germs unless they are carefully washed and *boiled*;
- the germs give the babies diarrhoea and they may die from lack of good food as a result (marasmus) or from loss of water from the body (dehydration);
- to make bottle feeding safe it is necessary to wash and then boil or

disinfect the bottles every time they are used. This requires a lot of time, a lot of trouble, a lot of fuel or disinfectant, and so extra money, in addition to the cost of the baby food; keeping bottles clean is especially difficult in poor rural families;

- when a mother is travelling it is difficult to carry milk and prepare it safely; breast milk is there and ready;

Nursing mothers should wear clean clothes, especially after working in the fields. They should wash, or if this is not possible, wipe their hands before handling their breasts.

If possible mothers should allow enough time to breast feed in a relaxed way.

If it is absolutely impossible, for health reasons, for a mother to breast feed, a cup and spoon, ***not a bottle***, should be used.

Mothers should breast feed their babies up to 18 months or 2 years to make sure that the babies get at least some of this valuable food for building their bodies.

Nature controls the flow of milk from the breast. During pregnancy, a woman's nipples enlarge but it needs the baby suckling to stimulate nature's machinery. When the baby starts suckling he takes the enlarged nipple right in his mouth and his gums press its sides, squeezing the milk out. This is the best way of making milk come in the mother's breast. Do not start bottle feeding because the baby cries. Nearly all African mothers have plenty of milk and the crying is almost certainly due to some other cause – because some crying is natural or because the baby is uncomfortable for some reason.

The baby's suckling is the best way to make plenty of milk come in the mother's breasts

The supply of milk comes in two stages: first the milk is made in the breast; then the milk passes into the ducts (small tubes) which lead to the nipple; this is called the 'let-down reflex'.

Both of these stages are stimulated by suckling. The suckling sends messages along the nerves, which results in chemicals (hormones) being released into the blood. When these chemicals reach the breast, milk is produced and then the ready milk is pushed towards the nipples where the baby can get it easily.

When mothers are working hard and may not sit down for long enough periods to let their babies get sufficient milk during the day, suckling during the night becomes important. African mothers are accustomed to

A pregnant woman should get some rest every day

having their infants in the same bed with them and no African mother harms her child by overlying him. Separate beds for normal children with normal mothers should not be encouraged. In addition to the nutritional advantage to the child of suckling at night, the sharing of a bed by mother and child provides the child with warmth and security and is, in some countries, a traditional way of spacing births. As long as the mother has her child with her, sexual intercourse is not practised.

Nursing mothers must continue to eat plenty of food, especially foods rich in body-building materials like peas, simsim (sesame), melon seeds, groundnuts, coconuts and if possible, some eggs, meat, fish and milk.

Even if babies are breast fed they may occasionally get diarrhoea. If so, the mother should not forget to give the child boiled water with a little sugar and a pinch of salt and to take him to the doctor or nurse immediately. He should continue to be fed breast milk.

What practical ideas about food needs in pregnancy and lactation, and the advantages of breast milk, can we discuss with families?

Pregnant and lactating women need more of the soups, stews, or relishes in the family meal than their husbands do, as they have to provide the materials for building the baby in the womb and for making milk.

If a family can afford milk, eggs, meat especially liver, and fish, pregnant and lactating women should have a generous share of these. If the family cannot afford these foods, a good substitute for providing building materials is a mixture of pulses and seeds such as beans, peas, groundnuts, soya beans and sesame (simsim) with cereals such as millet, sorghum, maize, rice, wheat or teff, and with green leafy vegetables and fruit. Pregnant and lactating women should eat plenty of these foods.

Pregnant women who continue to work hard need extra food, especially in the second half of their pregnancy. Lactating women also need extra food.

Pregnant women in cities who may not have much exercise should be careful not to become overweight as this is dangerous for health.

As soon as a woman knows that she is pregnant she should go to the clinic or hospital for her health to be checked. If anything is wrong it can probably be put right if found out early. She should follow the doctor's or nurse's advice. The best way to have a healthy child is to be a healthy mother.

A pregnant woman should try to get some rest every day and should not carry very heavy loads.

A pregnant woman must make sure that everything is clean before delivery – house, compound, her clothing, her body, the

cloth to wrap the child. She should have clean water ready for bathing the baby.

Too many pregnancies and too short a time between babies are dangerous for the mother and the child. An interval of about 3 years allows the mother to breast feed her child for 2 years before she becomes pregnant again, and gives her time to become well-nourished and strong again. It also gives her time to care for her baby well, to wean him slowly and give him lots of attention before he is replaced by a new brother or sister.

An interval of 2–3 years allows the mother to regain her strength between pregnancies

Remember that it is much safer for both the mother and child to have babies when women are between the ages of 20 and 35 years, rather than during the teenage years when the mother herself is still growing, or after 35 when more complications of birth are likely to occur.

Breast feeding is best for a baby. Bottles are dangerous because they are difficult to clean properly. They should not be used even if breast feeding is impossible; a cup and spoon are easier to keep clean (see p. 85). Breast milk is cheap, warm, clean, and suited to the baby. It never sours even if the mother is pregnant again. It needs no preparation and is always ready.

The more a baby suckles, the more milk comes. A baby should be put to the breast immediately after birth. If he will not suck, wet the inside of his mouth with a teaspoonful of clean water. The yellowish sticky milk a mother produces for the first few days is rich in the body-building materials the baby needs and it also helps to protect the baby from diseases. Babies should be allowed to suckle during the night as well as during the day, if they are hungry.

Breast-fed babies do not often get diarrhoea but if babies do get it the mothers should continue to breast feed them and should also give them boiled water with a little sugar and a pinch of salt and quickly take them to a clinic or hospital.

Mothers should breast feed their babies up to the age of 18 months or 2 years to make sure that toddlers get at least some of the valuable breast milk for building their bodies.

Mothers should breast feed their babies up to 18 months or 2 years to be sure that the toddlers get at least a little of this valuable body-building food

The infant and the child

We have said that breast feeding is best for babies. It gives all the nutrients an infant needs for the first few months of life. However, by the time the baby has reached 4–5 months of age, breast milk is not enough by itself as the child has grown larger and needs a greater amount of food

to keep growing well. Other foods need to be added to the child's diet. This is called supplementary feeding.

Sometimes, it is necessary to supplement the breast milk when the child is even younger than 4–5 months as children differ in their needs for food and mothers differ in the amount of milk they produce. If a child is not growing well on breast milk, the mother should continue to breast feed but add some plain well-cooked strained porridge made from a cereal flour. This can safely be done after the child is 8 weeks old, provided the mother starts with a teaspoonful the first time and increases the quantity gradually. It is not usually necessary, however, to add porridge before the child reaches 4–5 months.

All mothers should start giving extra food to their babies to supplement the breast milk, when the children reach 4 or 5 months of age. The first food should again be plain well-cooked cereal porridge, strained carefully if at all coarse. The porridge should be given before the breast, when the children are very hungry, until they learn to like it. After that it should follow the breast feed so that the children are still hungry for all the breast milk available. The supplement should be given with one breast feed to start with, gradually increasing the meals to 2 and then 3 each day.

Young children's stomachs are very small and they cannot eat much at a time, although they need plenty of food because they are growing fast. Therefore the porridge given them should be made fairly thick as soon as they have grown to like the taste and are digesting the thin porridge well. When they are accustomed to the plain porridge, in a week or two, purées (mashes) of soft-cooked vegetables, fruits, and pulses can gradually be added to the porridge to make nutritious mixes. These should be very smooth for the young baby and they can be sieved, or the skins and seeds removed carefully by hand and then the food pounded.

Give the baby his extra food from a clean cup and spoon, *not* a bottle

Children of 5 months can be given, in addition to breast milk, mixes which contain soft-cooked egg, meat scraped, cooked and pounded, cooked fresh or dried fish from which the bones and skin have been carefully removed, or animal's milk if this is available.

We must remember that:

- only a teaspoonful or less of a new food should be given to start with;
- only one new food should be added at a time;
- a cup and spoon, *not a bottle*, should be used to give the child the supplementary foods.

After a few weeks of receiving supplementary foods, the child should have learned to like, and should be able to digest, many different food mixtures of varied textures, made from a combination of:

a cereal porridge of maize, rice, millet, sorghum or wheat, strained if the flour or meal from which it is made is coarse. Sometimes a starchy root or fruit (sweet potato, plantain) can be given for variety. These should be boiled or steamed and mashed without skins;

with:

a purée (mash) made from cooked strained pulses or seeds (peas, beans, groundnuts, lentils, simsim, melon seeds (skinned), grams, soya

beans) or from flour made from these (see pp. 141–158). These should be very well cooked before they are added to the porridge as they take much longer to cook than cereal flours. Alternatively a cooked, sun-dried powder made from these foods can be added to the porridge (see p. 91).

and:

some cooked strained vegetable or fruit (pumpkin, sweet potato leaves, spinach, carrots, other green leaves, pawpaw, mango) and also strained fresh fruit juice or pulp. A sieve or strainer can be made from a clean boiled can. Small holes are punched in the bottom with a clean fine nail.

and, if possible

some lightly cooked egg, or milk, or flaked fish or scraped liver or scraped beef, cooked and mashed or sieved to be sure that no hard parts are left.

Such a mix gives a growing infant or young toddler all that is needed for health and growth.

Not every part of Africa grows *all* the cereals, pulses, vegetables, and fruits suggested, but every part of Africa grows some of each type so mixes like these can always be made.

After a child is 6 months old, a little oil or ghee, margarine, butter or red palm oil, about ½ teaspoonful to start with increasing to 1 teaspoonful, should be added to the mixture; and, gradually, seasonings such as onion or lemon juice can be added as well. A snack of soft fruit such as orange, mango or pawpaw can be given after one of the breast feeds.

By this age the child should be having 3–4 meals a day in addition to breast milk and each should contain some vegetable or animal food with good protein content.

By 9 months, the child's teeth will have begun to show and the food can be chopped instead of puréed although no hard stalks, skins, or bones should be given.

By a year old, children should be able to eat nearly all the foods from the family meal, cut up small. They should have a larger proportion of soup, stew, or relish, compared to the amount of cereal or starchy food they are given, than is necessary for adults, as they need plenty of proteins for growing. They should have at least 3 meals daily after they are fed at breast. Snacks of bean cakes or high-protein biscuits can be given (see pp. 143–153).

It is good for children to have some fairly dry foods as they grow older as such foods give them plenty of calories and protein without too much bulk (see p. 147).

The way to be sure that children are getting enough to eat is to take them to the clinic regularly to be weighed. If they are gaining weight steadily they are being well fed.

'Dry' foods like biscuits give a child calories and protein without too much bulk

Preparing the supplements to breast milk

The mixes described above (unless they are dried) should be prepared

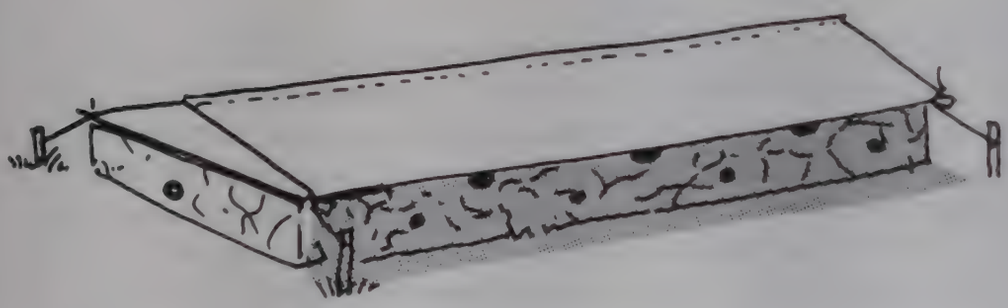
freshly every day. Enough can be prepared for 2 meals if the amount for the second meal is kept clean and cool. In parts of Africa where foods are steamed, the baby's mixture for each meal can be wrapped in leaves or put in separate containers and steamed with the family food. Each package or container is then sterile and is only opened when the baby is to be fed.

A good and time-saving way to prepare food for babies is to grind one or more cereals together with roasted groundnuts or simsim (skins removed) into a mixed flour or meal (see pp. 155–156). Any cooked dried pulse or seed and any cereal can be used for this purpose. For infants under 9 months, the flour should be sieved. The use of such a mixture makes sure that the young child has a good share of foods of good protein content. The mixed flours will not be considered food for adults or older children and so there will not be competition for them from other family members.

A busy mother can make her own 'convenience' foods for baby by cooking the parts of the mixes which will not be shared by the family, sun-drying them while protecting them from birds and dust, and then pounding, or grinding them into fine powders. These cooked powders, if they are well dried and are kept in airtight containers such as bottles with corks, screw-topped jars or tightly closed plastic bags, do not spoil easily and can be kept for a week or so. One or two teaspoonfuls of the already-cooked powder can be added to porridge or mashed potatoes or plantain, or gravy from soups and stews taken from the family pot. Foods which can be dried and pounded in this way are roasted groundnuts, roasted simsim or soya bean, cooked peas and beans, lightly cooked dark green leafy vegetables, shredded fish, and scraped meat or liver. These 'convenience' foods are much cheaper than imported jars of baby meals. The foods, provided they are stored in clean tightly closed containers, and are really dry, are safe for the child. They will be boiled again with the porridge or soup to which they are added.

Dark green leafy vegetables can be lightly boiled, dried, and pounded

A mother can make her own 'convenience' foods by cooking, sun-drying and pounding or grinding foods to a powder or floury paste



A sun-drier can be made at home with sticks, mud and plastic sheets; instructions for making this can be obtained from UNICEF, or from UNECA, Addis Ababa

to a powder which, if stored in airtight containers, will last throughout many months, and so can be available when fresh vegetables are scarce and expensive.

Egg and dried milk powder can also be added to the porridge. It is not necessary to mix the milk to a fluid. If fresh milk is available and cheap, the porridge can be made with all or part milk instead of water. This also is less dangerous than milk from a bottle as the porridge is boiled, which destroys the germs.

Weaning

When a child is weaned he should have his own plate; he should not have to compete for food with older brothers or sisters

Although different foods should be added to supplement breast milk from the time a child is 4 or 5 months old, breast feeding, as we have said, should continue if possible until 18 months or 2 years. Long before that time, the child should have learned to eat all the foods the family eats, so that it should be easy to take him off the breast gradually, that is to 'wean' him. This should be done carefully, withdrawing the different breast-feeds one at a time.

Weaning is the most dangerous time of a child's life; it is the time when he is most likely to become malnourished if he has not learned to like mixtures of many foods, and if he is not given plenty of these mixtures.

Sudden weaning is dangerous. The child may not eat because of shock and he may not be able to digest new foods given suddenly.

A mother should not send her newly weaned child away from her or put him in the care of people who do not know how to feed him properly. Sometimes, grandmothers or untrained nursemaids take care of the newly weaned children and they may believe that pulses and animal foods are dangerous for them and may feed them thin porridge only. This is sometimes the cause of malnutrition.

Separation from the mother on whose back and in whose bed he has spent much of his life may make a child very cold. The mother must see that he is kept warm.

When a child is weaned he should still have his own plate and spoon so that he can learn to feed himself without competing with his older brothers or sisters who can eat much faster than he can.

Artificial feeding of infants

If a mother dies or is very sick, her child may *have* to be fed with cow's milk or the milk of some other animal, or by canned or powdered milk. It is important to know how to do this should an emergency arise because artificial feeding which is not properly managed, and especially when it is unhygienic, can mean sickness or even death for the infant. However, this information should only be used in emergencies. We should not teach normal mothers how to feed their children artificially. We should not even mention this subject but assume that every child will be breast fed.

The following points can help us in advising families where artificial feeding cannot be avoided.

Cup and spoon feeding

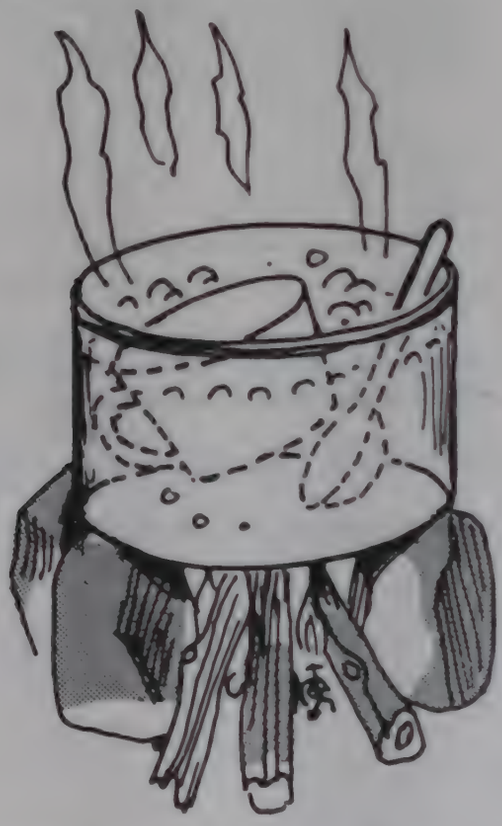
Use a cup and spoon, washed well and boiled or washed with a little disinfectant in boiled water each time they are used to make sure they are clean. Feeding by cup and spoon takes longer than a bottle but is safer. (See p. 89).

Milk

If a mother is going to feed her child artificially she must know what kind of milk to buy. It is probably best to buy *full-cream dried milk* as it is easier to keep than fresh milk in hot climates, and supplies are more dependable than fresh milk. In some places this milk is available through clinics or in shops in plastic bags. This milk is usually much cheaper than commercial brands and is just as good. Families should have a month's supply at a time in case they have no money towards the end of the month. Fresh cow's milk can, however, be used, or the milk of other animals, or *unsweetened* evaporated milk (sweetened condensed milk should *not* be used).

It must be remembered that as soon as dried milk is mixed with water, it *spoils as fast as fresh milk.*

If cow's milk is used, either fresh, canned or dried, it needs to be diluted for very young infants and a little sugar added to make it more like human breast milk. This is the only time when normal children need sugar in their diets. One of the following formulas[1] can be taught to families according to which kind of milk is chosen.



If artificial feeding cannot be avoided, a mother must be taught how to prepare the baby feed

[1] Adapted from *Manual on Feeding Infants and Young Children*, by Margaret Cameroon and Ingve Hofvander, 2nd edition, the Protein-Calories Advisory Group of the United Nations System, December 1976.

Preparations for feeding infants up to 3 months of age

Approximate daily volume: 150 ml per kg of body-weight of infant
or 2½ ounces per lb of body-weight of infant

Infant's average weight: 4.6 kg
or just over 10 lb

Total energy requirements/day: 550 nutritional calories (kilocalories)

Protein requirement/day if cow's milk is used: 14 g/day

Number of feeds needed (quantities as shown below): 5 daily at 4-hourly intervals

All measures are level:
1 cup = ¼ litre or 8 oz
1 teaspoon = 5 g or 5 ml
1 tablespoon = 15 g or 15 ml

Type of milk[1]	*Cow's milk boiled*	*Full-cream milk powder*	*Evaporated milk (unsweetened)*
Dilution			
milk	2 parts (100 ml or ½ cup)	14 g (1½ tablespoons)	50 ml (2 tablespoons)
boiled water	1 part (50 ml or ¼ cup)	150 ml (¾ cup)	100 ml (½ cup)
Add			
sugar	10 g (2 teaspoons)	10 g (2 teaspoons)	10 g (2 teaspoons)

Nutritional value per 100 ml (3½ oz) of feeds:

From the boiled cow's milk mixture	calories	70
	protein	2.2 g
From the full-cream milk powder mixture	calories	75
	protein	2.4 g
From the evaporated milk mixture	calories	75
	protein	2.3 g

Note: These values are per 100 ml of the mixtures, *not* for the quantities of the mixes per feed given above.

[1] Condensed sweetened milk or dried skimmed milk should *not* be used for babies.

Preparations for feeding infants 3–5 months of age

Approximate daily volume: 150 ml per kg of body-weight of infant
or 2½ oz per lb of body-weight of infant

Average infant's weight: 6.7 kg
or 14¾ lb

Total energy requirement/day: 770 calories (kilocalories)

Protein requirement/day if cow's milk is used: 15.5 g

Number of feeds needed (quantities as shown below): 5 daily at 4-hourly intervals

All measures are level:
1 cup = ¼ litre or 8 oz
1 teaspoon = 5 g or 5 ml
1 tablespoon = 15 g or 15 ml

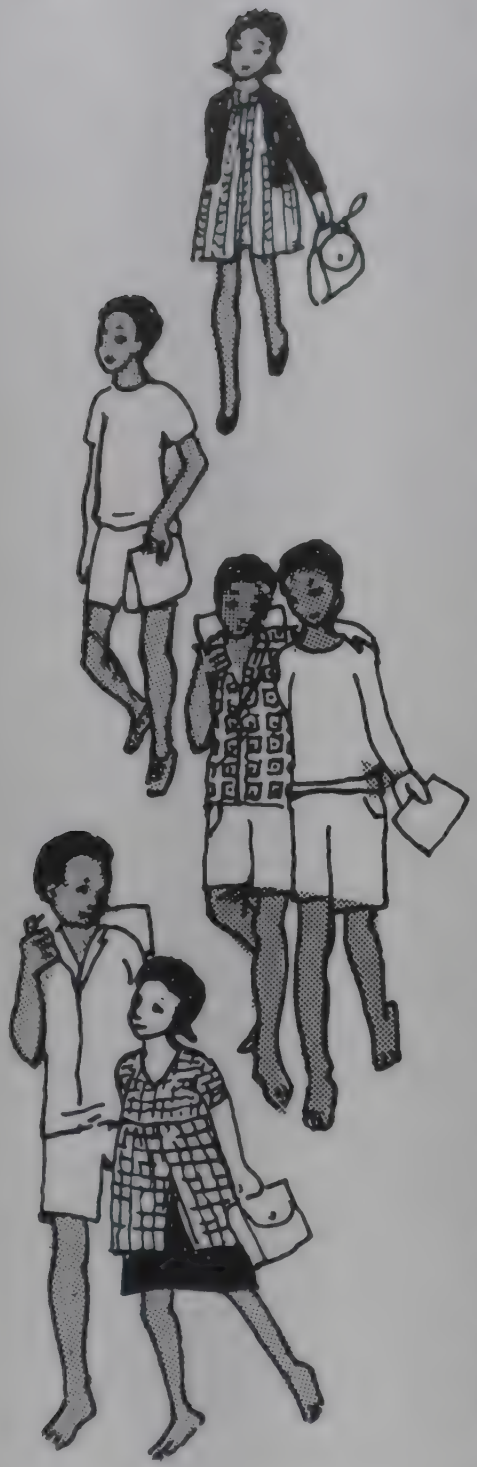
Type of milk[1]	*Cow's milk boiled*	*Full-cream milk powder*	*Evaporated milk (unsweetened)*
Dilution			
milk	175 ml	25 g (3 tablespoons)	80 g (3 tablespoons)
boiled water	1–2 tablespoons	200 ml (¾ cup)	120 ml (½ cup)
Add			
sugar	10 g (2 teaspoons)	10 g (2 teaspoons)	10 g (2 teaspoons)

Nutritional value per 100 ml (3½ oz) of feeds:

From the boiled cow's milk mixture	calories	105
	protein	3.5 g
From the full-cream milk powder mixture	calories	110
	protein	4.3 g
From the evaporated milk mixture	calories	100
	protein	3.7 g

Note: These values are per 100 ml of the mixtures, *not* for the quantities of the mixes per feed given above.

[1] Condensed sweetened milk or dried skimmed milk should *not* be used for babies.



School children need plenty of food for growth and vigour

School children

When children reach school age, they are still growing and need plenty of calories and proteins and also minerals and vitamins, although the growth of children slows down somewhat during early school years. It becomes very rapid again around the age of puberty and adolescent girls and boys can eat, and need, surprisingly large meals. At this age they are usually very active as well as growing very fast.

We have pointed out earlier (p. 58) that school children who do not get enough food cannot concentrate and learn well. Many of them become drop-outs. It is therefore essential that families learn the importance of giving their school-age children good breakfasts, and of making sure that the children carry lunches to school if there is no school meal provided and they cannot, because of distance or the schedules of parents, have good lunches at home. The 'packed' lunches should be mixtures of foods – cereals, pulses, fruits and vegetables, with some animal food, fish or meat or eggs or milk if possible. They should be good substantial meals, meeting at least a third of the child's energy requirements. Fizzy drinks and candies are not adequate substitutes for a good meal. If a child is given a few cents to buy lunch it is much better if he spends these on a handful of groundnuts than on a fizzy drink or candy.

Sometimes it is possible to enlist the help of parents and teachers in providing a school lunch. This makes sure that all the children have a proper meal during school hours. This meal should not be considered a substitute for a good dinner when they arrive home. Children need 3 good meals a day at least.

Adolescents need more food than their parents because they suddenly start to grow very fast and they are usually very active.

What practical ideas about feeding infants and children can we discuss with families?

Breast milk is nature's food for a baby and gives most infants all they need for the first 4–5 months of life.

Babies should sleep with their mothers so that they can suckle during the night if they are hungry. This is often a traditional way of spacing children.

After 4–5 months, the child has grown bigger and needs other foods *as well as* breast milk.

The safest way to know when children need extra food is to have them weighed regularly at a clinic. If they stop growing well they are not getting enough. This can happen to some quite young babies as some need more food than others, and women give different quantities of milk.

In any case, even if children have been growing well, extra food should be given by the time they are 5 months old beginning with 1 feed and increasing to 3 gradually. Smooth plain cereal porridge,

strained if necessary (if it has coarse particles) should be the first food, and only a teaspoonful should be given at a meal to start with. It should be given before the breast milk until the infant gets to like it. The quantity should be increased gradually. Porridge prepared for the family can be strained as the basis of the baby's meal, to save an extra cooking pot. When children have got to like the porridge it should be given about three times a day *after* the breast milk so that they take as much milk as possible before eating the porridge.

Food supplements should be given at least 3 times daily

After a few days, other foods should be added to the porridge, one at a time, to allow the baby to learn to like each new food before the next is added. The cheapest good building foods to add are usually flours or mashes made from cooked pulses like peas, beans, ground-nuts. It is safest to cook the pulses before they are mashed or before they are dried and pounded, as they take longer to cook than the cereal porridge. If they are not well-cooked the baby cannot digest the pulses and gets diarrhoea.

If a family can afford a small amount of some cooked fish, egg,

Fruit juice or purée can be given as a snack

liver, meat, or fresh or powdered milk, these should be added to the porridge in a smooth, easily digested form.

All the foods for babies and their dishes and spoons must be very clean. Plates and spoons should be washed with soap and boiled in water.

Babies' stomachs are small so that, as soon as they have learned to eat the porridge mix, they should have *at least* 3 meals a day in addition to breast milk. Snacks can also be given.

Cooked and well-mashed green leafy vegetables or yellow vegetables like carrots, or pumpkin, and fruit purée or juice made from well-washed pawpaw, mango, oranges or tomatoes, should be added to the mix; the fruit can also be given as snacks. All skins, seeds and coarse parts should be strained or picked out beforehand.

By 1 year old, babies should have learned to eat almost all the foods the family eats, but cut up small for them. They need more of the relishes, soups, or stews compared with the amount of cereal or starch they eat because they are growing fast. They need 3–4 meals a day after breast milk.

It is good for children from about 9 months onwards to have some dry foods such as bread or biscuits (see pp. 147–152) as this allows them to have more growing and energy materials with less bulk. The biscuits and bread should not have coarse parts in them.

'Convenience' foods for the infant or small child can be made by cooking, drying and pounding or grinding pulses, like beans, peas, and groundnuts, fish or meat and vegetables, and keeping them in tight containers. Because they are cooked, they can be added to the porridge when it is nearly ready.

Flour for the baby's porridge can be made by grinding or pounding together different cereals and cooked dried pulses (with skins removed).

Sudden weaning upsets a child and he may stop eating

Weaning, that is taking the child off the breast, should be gradual and should take place after the child has learned to like many other foods. Sudden weaning upsets children and they may stop eating altogether. Weaning is the most dangerous time of children's lives and they need lots of good food and plenty of attention and love. Even if a mother becomes pregnant again, the child on the breast should be weaned gradually. The milk of a pregnant woman is *not* poisonous and it will do neither mother nor child harm to take a few weeks to accustom the child to a good mixed diet.

A new pregnancy should not be started, however, until the child has been weaned gradually and is eating the family food. Young children should have their own clean bowls and spoons so that they do not have to compete with older brothers and sisters.

When children reach school age, they are still growing and still need 3–4 good meals a day. They should have a good breakfast before they leave home in the morning, and if no lunch is served at school they should carry lunch in a tin or jar, wrapped in leaves, or in another kind of container. The lunch should be made from a good mixture of foods such as rice, beans, oil and fruit, or roasted groundnuts, millet bread and cooked green vegetable or boiled sweet potato with a piece of fish and tomato. Some fat or oil in cooking helps to give extra energy.

School children who do not have enough food which gives plenty of energy and body-building materials cannot learn well.

Adolescent children need more food than their parents as they are growing fast as well as working and studying.

The weaned child should have his own bowls and spoons

5 WHY MALNUTRITION? ASSESSING ITS INDIRECT CAUSES

5.1 Possible causes

We have looked at some of the causes of malnutrition in a population and especially in children. These are, to summarize:

- not enough total food (quantity);
- not enough of the particular kinds of foods the body needs (quality);
- infections linked with a not very good diet.

We must go further, however and ask ourselves why children have not enough food or the wrong kinds of food so that infections tip them over from being slightly malnourished to acute cases of malnutrition. We cannot give families sensible and practical advice about improving their diets unless we know the reasons why certain foods are eaten and others not eaten. In other words we must try to find out the indirect causes of malnutrition.

The baby may have been weaned early and suddenly because of a new pregnancy

Ignorance of nutritional needs and traditional child-feeding practices

- Parents may know nothing about the nutritional needs of children.
- Babies may have been weaned early and suddenly because of a new pregnancy.
- Weaned children may have been sent to their grandmothers who do not know what foods children need.
- Babies may have been born small because of too many pregnancies too close together.
- Children may have been fed only on thin starchy porridges after early weaning.
- Babies may not have had adequate supplements to breast milk early enough.
- Children may have been weaned too quickly before they had adjusted to a variety of different foods.
- Babies may have been fed coarse foods from the adult diet too soon, so that they could not digest them.
- Mothers may have believed that they were doing their best for their

children by giving them expensive powdered baby foods, but they may have been diluting the mixtures too much because the food is expensive.

- Mothers may think that it is bad for children to eat meat, eggs, chicken, beans and other protein-rich foods until they can walk. They may have given only porridges and gravy.
- The foods the mothers have been giving children have been too full of water and therefore too bulky for them to eat enough to get the calories and nutrients required.
- Children may have been given food only when the adults eat, so they may have had too few meals a day to meet their needs.
- Children may have been given very small servings.
- Young children may have had to compete with older children for the relish or soup and may have managed to get only a little of these foods.
- Children may not be given breakfast.
- Young children may be too sleepy at night to eat a good supper.
- Children may be catching infections because they are not immunized.
- They may be catching infections or infestations because the environment they live in is contaminated by excreta, and because flies or other insects breed there.
- They may be catching infections, like diarrhoea, and also parasites, because their feeding dishes or bottles are not perfectly washed; or because the water they drink is not boiled and it comes from an unclean source.
- They may have been denied food because they were sick.
- They may not have been allowed to eat certain foods because they are taboo or considered to be harmful or bad for the character.
- They may not have been taken to the clinic or dispensary for check-ups and weighing.
- Much food may have been lost through bad storage practices so food may be short.
- The mother may not know how to preserve food for the 'hungry months'.

A child may be too sleepy to eat

Poverty or conflicting use of money

- The land of the family farm may be very small.
- The family may have too many children for the parents to support well.
- The family may not be able to afford the extra money to build good food stores.
- The father and mother may be unemployed.
- The mother may be sick or have become pregnant again too quickly or the father may be too sick to work.
- The father may not give the mother enough money to buy good food.
- The family may not have money to buy fuel.

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If the mother spends too much on clothes the children may not get enough to eat

- The mother may be working so hard that she is not able to give enough attention to her child.
- The family may have needed money for school fees, clothes and other expenses, so they have sold much of their crop for cash and the family diet is very sparse.
- The children may have a poor diet because the father spends a lot of money on drink.
- The children may have a poor diet because the mother spends the housekeeping money on clothes.
- The family may have moved to the city where home-grown foods are not available and where the cost of living is high.
- The newly urbanized family may value refined foods and fizzy drinks above a good mixed diet, and not have money for both kinds.

There are, however, millions of families in Africa who cannot possibly have an ideal diet because they do not have the money to buy the necessary foods, or land to grow them, or because they *must* sell their produce to pay for essentials in the modern cash economy which is replacing traditional subsistence farming and barter. In many countries families *must* pay taxes; in some they cannot send their children to school without paying fees, and paying for uniforms, books, geometry sets and levies for items like the 'roof fund'. Clothing and transport cost money.

The following example of an actual monthly budget, which was calculated by participants at a Government UNECA/FAO trainers' workshop in one East African country, is common enough for workers on plantations, or in mines, for urban labourers, or for employed workers in villages.

This family has the equivalent of about US$25 per month (around 200 East African shillings)[1], and a plot of land where they grow maize and beans and some vegetables. There are five surviving children, boys of 11 and 7, and girls of 6 and 3 and 1 year. Two children have died.

[1] Inflation may since have changed the amounts paid and spent but the level of living has not improved.

The essential items to be bought every month by this family are shown in the table below.

Item	*Cost* (US$ equivalent)
Maize	brought from farm
Beans	brought from farm
Vegetables	brought from farm
Firewood	gathered free
Rent	4.00
Sugar	0.64
Tea	0.16
Dripping or fat	0.32
Salt	0.16
Paraffin for light	0.29
Matches	0.05
Soap	0.64
Clothes[1] average per month (including work clothes, school uniforms and shoes) for the 7 family members	6.90
School fees and other school expenses for 2 boys (to be saved for payment each term)	3.20
Transport for father	2.00
Medicine	0.35
Meat (a small quantity for 40c once a week)	1.60
Bread (very occasionally)	0.80
Taxes (to be saved for annual payment)	1.05
Total	22.16

[1] Shirts cost the equivalent of US$6–10; it is difficult to buy shoes under US$5–10 per pair.

After this meagre amount of food has been bought, as well as other essentials, there only remains $2.84 per month to cover all other expenses for extra food purchases, recreation, hospital charges, travel, household items, cleaning materials and unexpected expenses. Unfortunately it is unlikely that there can be any savings and it is obvious that the family meals can have very little animal food in them. If the family could not grow most of its staple foods it would have a very poor diet indeed. Even allowing for home-grown maize, beans and vegetables, it will be impossible to pay school fees and uniforms for the third, fourth and fifth children. In such a family, the number of children exceeds the resources available to give them a good life.

Many extension workers make the mistake of advising families such as this one to buy milk, eggs or meat every day for their children, and suggest menus which are excellent for nutrition but quite beyond the family's reach. Giving impractical advice is one reason why field workers often do not motivate families to change to better practices.

Community problems which can contribute to malnutrition and poor child development

It is not always possible for an educator or extension agent to tackle the community problems which can lead to bad nutrition. Nevertheless the effect of these problems on nutrition can be severe. Such problems may include the following.

- Transport is difficult for the population and there are no nearby markets to sell produce.
- Land tenure is unsure; people have no security that, if they invest in their farms, they themselves will reap the benefits in the future.
- People have to sharecrop, that is give a large part of their produce to a landlord.
- Drought, erosion or infertility of soil make crop yields very low.
- There is a widespread ignorance of modern agricultural methods.
- Locusts, birds or other predators are common.
- Community water supply is bad.
- Bilharzia infects the streams and ponds.
- Children have to walk a long way to school.
- There is no clinic or dispensary within easy walking distance of most of the families.
- Local witch doctors are very powerful.
- Local midwives have had no modern training.
- Agricultural extension, community development and home economics officers have large areas to cover and each has transport difficulties. They work independently, not as a team.

5.2 Studying the causes

Let us assume that, as suggested on p. 26, we have learned from our own observation that the people of our district, especially the children, seem malnourished. We will also assume that we have confirmed this by asking the doctors and health staff at the nearest hospital, the maternal and child health clinic, the health station or the dispensary. We now want to summarize the information we have obtained and to add to it as much as we can about the reasons why children, in particular, are suffering from nutritional deficiencies and are not developing as well as they should. How do we go about this?

We can make a study of the patterns of living of the people in our area, or, to use the term employed by health staff, 'a community diagnosis'. This is to find out as much as we can about the causes of malnutrition, of the high sickness and death rates and slow development in children, and of the frequency of drop-outs from school. We can collect data from all sources possible *including the people of the area themselves.* On the evidence we collect, we can decide what are the most important factors which are working against the good growth and health of the children and families in the community, and we can plan *with the local people* which of

these can be changed and how they can be changed. In such a survey we can find out about other aspects of family life as well as food, nutrition and health, for example incomes, educational levels, skills, beliefs and aspirations, so that we can really help families and communities to achieve integrated development.

We must be careful not to start an enquiry or community diagnosis unless we have the intention and the possibility of an action programme to follow up the results. Such a study costs families time, and hopes are raised. If the study is not followed by action, people become disillusioned and it is harder to start anything next time.

How do we make a community diagnosis?

By involving workers from other services

We must contact the officers of other services in our area and try to enlist their interest and participation in planning and carrying out the study. Such a study is much more valuable if it is an inter-disciplinary activity. The approval and support of the district or area commissioner or governor is, of course, needed.

By involving local leaders

As an inter-disciplinary group we can make a plan. One of the first actions in planning should be to consult the local official and unofficial leaders and to involve them in some of the practical details of planning. Through them we must interest the people in the area themselves and motivate them to cooperate with us. A community self-survey, in which people participate in the arrangements from the planning stage, has been found to be more likely to lead to action than a survey made by specialists only. In such a self-survey the local people help in identifying their own problems by community effort.

It is important to go through the correct channels to reach the people of a community. This may, for example, be a headman and his council of elders, or trade union leaders, or the chairman of the local development committee, or local representatives of the government. The correct channel varies with the social organization of the country but this is always an essential step. Our own liking for the local people, and the warmth and politeness which we show when we talk to them, are important factors in arousing their interest and support.

Involve other workers

By following a careful plan

Our initial plan for the community diagnosis may consist of 5 steps:

- summarizing the data on health and nutrition which we have found from our preliminary enquiries and observations;

- finding out as much as we can about what others have studied or reported before us concerning the people and the area, and making use of this available knowledge;
- visiting a selected number of families and finding out about their problems and their patterns of living;
- analysing the data;
- identifying the main problems.

The following are some suggestions on how to carry out these steps.

Summarizing the data on health and nutrition

Any data which the local hospital, clinics or dispensaries can provide should be summarized in collaboration with the health staff. The following data for the community, although not exhaustive, should be included if possible:

- the percentage of children who, on admission to hospital or on registration at the MCH or under-5 clinic, dispensary or health station, have weights-for-age below the 'road to good health';
- the percentage of the children from 1–4 years with an arm circumference of less than 13.5 cm;
- the number of cases of kwashiorkor seen during the past year;
- the number of cases of mixed protein–energy malnutrition seen during the past year;
- the number of cases of other nutritional deficiency diseases seen during the past year (specify which);
- the availability and cost of foods in the market;
- the crops grown in the area and whether these are used by the families or sold;
- the child-feeding and weaning practices;
- the average birth intervals;
- the average number of children born per woman; death rates;
- the number of children born to teenage mothers;
- the number of children born to women over 35;
- the availability and use of family planning services.

Talking with old people about patterns of living in their youth

Finding out what others have reported about our district and its people

We can do this by:

- asking permission and looking through the district government files to find any reports of health, agricultural, social, economic, or population surveys, annual reports, records or other sources of information. From these we may find out something about the reasons behind the health, nutritional, and child development problems of the community;
- looking in university, college or research institute libraries for the same type of data;
- speaking to informed professional workers who know the area – district officers, school inspectors, lawyers, missionaries;

- talking to some of the oldest people in the area to find out what used to be the pattern of living and the diet and why changes have come about;
- reading the letters, editorials, and comments in the local or national newspapers, and listening to people discussing what they read in the papers or hear on the radio. This can be a good guide to attitudes.

Visiting a selected number of families

If possible, the families visited should be what is called a 'random sample', so that they can represent, fairly, all the families in the community or area. This means that every family must each have the same chance as the other families of being chosen to be part of the survey group. In other words they must be chosen by a kind of lottery. If there are not too many families in the community or area being studied, they can be listed and each given a number. Then each number is written on a piece of paper and put into a bag. The numbers are drawn out of a bag one by one until the number of families needed for the study is reached. Usually a few extra numbers are drawn and if some of the original families selected are away from home or unable to take part, these extra families are added to the group in the order in which they were drawn in the lottery.

If the population is very large, it is possible to make a list of families, to choose one of these by lottery, and then to visit every 5th, 10th or 20th family on the list beginning with the number selected by lottery.

If more than one community is being studied, the villages or communities in our district can be listed and a few chosen by lottery. Then the families in each of the chosen villages are selected in one of the ways described above.

Lists of families or households can be made from tax lists, or voters lists, or any list which includes all households. Another way is to number the houses on a large-scale map, or even on an aerial photograph which can sometimes be found in the national or district survey office.

It is best if the draw of the lottery to select the families in the survey group is made in cooperation with the local leaders, or even at a public meeting, so that everyone *sees for themselves* that it is just chance that they are in the survey or not in it. A small child can do the drawing so everyone knows that the draw is fair.

When the families are chosen, the members of the inter-disciplinary professional group can visit the families, perhaps several times, and talk to them and observe their way of life. Sometimes students from a local college might be used to make these visits. The group which is to make the enquiry requires careful training first so that all members use the same procedures and bring back valid and comparable data. If necessary one or two staff of a particular agency can make the study with a few helpers, but it is better if the health, agriculture, education, community development officers, teachers, extension agents and field assistants in the area are involved together and also the local leaders, as this makes a good team for future action.

The members of the inter-disciplinary group working in the area can visit families to talk with them and observe their way of life

If the families to be visited have not been involved in the lottery and are unknown to us, we must arrange to be introduced to each family by people they trust and respect. This, in different societies, could be a headman, a chief, a trade union leader, a priest, a respected official or perhaps a midwife from the clinic or the school teacher. The actual category of person most trusted will differ from place to place.

A social notebook with topic headings and spaces for the interviewer to write down observations, comments, and people's replies to questions is a useful way of recording data in a form easy to analyse. Such a notebook is filled in by the survey worker following each interview. It is not a questionnaire. In some ways it is better than using a questionnaire for obtaining true information as the visitor can chat informally with the family members until she or he understands the position or problem, without frightening people with pages of formal questions. Before the study starts, the inter-disciplinary group should draw up a list of questions or points about which information is needed, so that everyone concerned is getting information on the same subjects. Everyone has the topic headings arranged in the same order, although they need not complete the sections of the notebook in sequence.

The list can begin with information on family members, their names, ages, sex, relationships to the head of family, levels of education, occupations, languages spoken, and sometimes religion. Then health data can come next. By observation and conversation, the interviewer can find out whether any children in the family are sick or look obviously malnourished or undernourished. In some societies it is possible to ask the mother how many children she has had and how many are living; also the years of births of the children and the ages at which deaths happened. In others, however, this cannot be done, or at least not within the home. It is important to check the kinds of information sought with the local leaders to ensure that nothing is asked which will be offensive or asked in an unacceptable way.

Data on food and nutrition can follow. The interviewer can find out what foods the family eats, the length of period of breast feeding, what the young children are given to eat, what are the weaning practices, the meal patterns and how many meals are given to young children daily. It may even be possible to obtain a record of all foods eaten by the family (and by the infants and toddlers) for the past 24 hours, and to get some idea of quantities either by watching or by asking the mother to estimate in cups or pieces. Other important points to note are how the food is divided up in the family. Do the young children have food given on plates of their own? Have the children been inoculated, and if so against which diseases? Are they taken to a clinic regularly? Do they have clinic growth record cards and, if so, is their weight-for-age growth curve normal?

Various questions can be based on the lists of common causes of poor health, growth and malnutrition given on pp. 100–104, adding others important locally and leaving space for any problems brought up by families. The interviewers could take a tape measure with them and record the arm circumference of the under-5 toddlers and children (see p. 36).

Analysing the data and identifying the main problems

The data collected from all sources must then be tabulated and analysed to identify the most important problems and the factors contributing to these. It is necessary to grade the significance of each factor as it affects the nutrition of the family (especially of the children), and child development. In an excellent book called *Nutrition for Developing Countries*[1] it is suggested that 'blocks in the pathway to good nutrition' be graded as follows:

Block of no importance	o
Block may or may not be important	±
Block is there but of little importance	+
Block quite important	+ +
Block very important	+ + +
Block so important that it is the only one that really matters	+ + + +

For example, some of the points on the study list could be written and graded as follows:

	The importance of the block
● The parents know very little about the nutritional needs of children.	+ + + +
● The children have been born every year and this has affected the nutrition of the mother and has curtailed breast feeding of the infants.	+ + + +
● The farm is too small to support the size of the family.	+ +
● The mother does not have time to look after her young children.	+ + +

It is also possible to grade by using points, for example:

5 – of the utmost importance
4 – very important
3 – important
2 – fairly important
1 – not really of much importance
0 – no importance

When the data from all the families are collected they should be summarized, to show:

- information on the families and their members, including information on farms, foods grown, foods sold, incomes, money spent on food;
- the number and percentage of children who seem malnourished;
- the average number of children born to each age group of women in the study; the number of these who have died in childhood and the ages at which deaths occurred; the number of stillbirths;

[1] King, M., King, F., Morley, D., Burgess, L. and Burgess, A. *Nutrition for Developing Countries*, Oxford University Press, Nairobi, 1972.

- the typical foods given in supplementing breast milk; the ages at which supplementary feeding starts; and the length of breast feeding;
- the typical foods given when a child is weaned and the patterns of weaning;
- the typical family meal patterns; distribution of food in the family;
- the typical foods given to pre-school children and to school children;
- reasons behind malnutrition and which of these are the most important.

Erosion and infertile land limit the food which can be grown

6 STARTING A NUTRITION AND FAMILY LIFE EDUCATION PROGRAMME

6.1 How do we start an education programme?

Many books have been written about working with communities to try to help them improve their standard of living (See Appendix 3). In this manual it is only possible to point out some of the most important things to remember when trying to develop a nutrition and family life education programme.

Since problems of nutrition, family size, and child growth and development are closely related to the availability of foods, to poor hygiene and to poverty, they cannot be solved in isolation. An integrated community programme is needed in which the people of the community and field workers from all services take part. If leaders, village families and field staff have already taken part, together, in the community diagnosis (self-survey), they are likely to be interested already in the results. They may by now have learned much, and ideas and attitudes may have begun to change.

While explanations and discussions are necessary parts of nutrition and family life education, they are wasted unless they lead to action. Such action depends on people making up their own minds that it will benefit them, and taking the decision, individually or as a group, to act. We must therefore put the findings of the community diagnosis before the villagers in a form that they understand, so these can be discussed and decisions taken. When people have decided what problems are most important to them, we and other services in the area can help them to draw up a community plan to improve conditions.

Some of the things we can do to bring the community together and to help them understand the problems and to make decisions are described below.

- Use our contacts with leaders and families and with officials and staff of other services, including those made during the survey, to invite them to take part in the discussion and planning. Visit these families and people for friendly chats. Winning the confidence of people is the first step to helping them.

Winning the confidence of people is the first step in helping them

- Invite people to meetings where the results of the survey are presented using, if possible, slides, pictures and other visual aids and perhaps tape recordings. Ask them to discuss these and to pick out the problems most important to them.
- Ask them to choose a committee which will decide on what people want to try first and which will make a plan which can be presented to everyone for approval. Such a plan should include an estimate of things and people needed, and costs and how they are to be met. Although ministries, local government or aid organizations may be able to help, it is important that the local people themselves give or pay something so that it becomes *their* plan of action.

6.2 Focusing on the particular community

Men must be involved as well as women and young people

There are some things which we must remember or be careful about when trying to help a community to improve their family life, child development and nutrition; these are described below.

- It is important to identify the groupings, viewpoints, disagreements and loyalties among the people of the community, since everyone will not be friends or hold the same opinion about things.
- We must make sure that any committee representing the community *really* represents the weak as well as the powerful, both sexes, and different age groups. Child feeding and child spacing are very personal family matters which powerful leaders cannot impose on their poorer neighbours.
- There are usually many people with particular skills in or near a community – perhaps farming, building, marketing, cooking, drawing, singing, dancing – who could help with the action or the educational parts of the programme. Try to see that such people are involved.
- Staff of ministries and voluntary agencies must set a good practical example by themselves following the recommended practices.
- While the situation of women in a society often needs to be greatly improved, tact is required to avoid arousing antagonism among people who are reluctant to break with tradition.
- In many societies women have little say in decisions, are overworked, and only praised and respected when they have children, especially sons. Their position in the community depends on child bearing. They cannot then be expected to welcome advice on family planning or spacing unless some other form of gaining prestige and reward is open to them.
- Plans prepared by communities should centre on what *they can do themselves*, not on recommendations to government. In most cases some help will be available for a good plan, from government or aid agencies, but the emphasis needs to be on 'what we are going to do' rather than on 'what you (government) should do'. Some money,

however little can be afforded, should be contributed by the local people, so that they are less likely to lose interest.

- Any plan should start with priorities which the local people can do something about immediately. They cannot change, for example, land tenure laws but could certainly tidy up the compounds, and probably grow more pulses.
- All our teaching and demonstrating must be about things which local people could actually do with equipment and supplies they have or could have, perhaps with a little help. Language used must be understandable and include the local names for things.
- Many women have learned about nutrition through talks and demonstrations at clinics and clubs but what they have learned com-

A good store for every family may be a target and the number of rat-proof grain stores built *and used* can be counted

monly does not get put into practice because it does not fit either their home conditions, their husbands' views or their purses.

- Men and boys as well as women and girls need to be involved, as men usually (not always) make the major family decisions and control family money.
- School and community programmes should support, not contradict, each other.

6.3 How do we know if things are improving?

The community diagnosis has given a baseline from which to measure whether or not progress has been made. Any plan should state targets for what the community wants to achieve in one or more given periods of time. It should also state how progress from the baseline and *towards* the target is to be measured in each case. Suppose, for example, that an important problem was high grain losses in farm storage. It was found in the survey that only 2 out of 100 families had and *used* rat-proof grain stores. The target set might be that in 3 years 90 per cent of the families would have a rat-proof grain store. Progress could easily be measured by counting the grain stores and checking if they were being used.

It is not enough to measure from the baseline only. If only 4 instead of 2 families had grain stores by the end of 3 years, it would be possible to say that the number of families having stores had doubled or increased by 100 per cent. This, although sounding good, would actually be little progress towards the target of 90 families with stores.

Some possible parts of a community programme to improve nutrition and child development are described below.

Problem: Most babies are not given supplements to breast milk until 1 year old.

Target: All babies are given supplements by 5 months old.

Measurement Method: At 1 year intervals, talk with each mother of a baby between 5 months and 1 year in the community and count how many are getting supplements and how many are not.

Problem: Few pulses are grown by farmers in the community. Families do not use pulses in feeding babies and toddlers.

Targets: All farmers will grow some beans or groundnuts for his family; all babies and toddlers 5 months to 2 years old will be given some pulses.

Measurement Methods: At yearly intervals:

Count number of farmers growing beans and groundnuts.

Check whether these pulses are all sold or if some are used by the family for food.

Check which babies and children under 2 years are given meals with pulses in them.

Problem: The village is dirty, with rubbish scattered about.

Targets: To build a community incinerator; every household to take their rubbish to be burned by the men and older boys taking turns.
Measurement Method:
Check after 3 months if an incinerator has been built.
If so, check how many families take all their rubbish to be burned daily.

Such evaluation, although simple, tells us to what extent the community effort is a success. This is an important part of our responsibilities and helps us improve our efforts.

7 PRACTICAL LEARNING EXPERIENCES

Practical exercises are a vital part of any course or training workshop. The following practical learning experiences which have been used in training courses or workshops by members of the FAO or ECA staff are therefore included in this manual. Although each of the practical learning experiences included has been tried out in some course or workshop, these courses or workshops have varied greatly in level and objectives. Some have been post-graduate inter-disciplinary courses in nutrition, some have been specialized child-care training and some have been short workshops for planners and trainers. However, most of the practical exercises suggested require no more than intermediate level training at certificate or diploma level. Graduates of agricultural, community development, health or home economics courses, at this level, are familiar with the necessary arithmetic, and use of tables, graphs and measurements included.

Practical exercises 1–7 are related to child development and family life. Exercises 8–12 concern assessment of child growth, nutritional requirements and food composition. Exercises 13–15 deal with meeting nutritional requirements economically. Exercises 16–20 are on the preparation of high protein/high calorie foods, suitable for supplementing breast milk, weaning, and family diets. The last exercise presents a simple way of testing the acceptability of the dishes prepared which can be used with any group of children or adults, including illiterate people.

It is hoped that the suggestions given here may be useful in providing ideas to trainers for developing their own teaching/learning situations.

7.1 Family visits to study child-rearing practices and child behaviour

Objective

To identify those attitudes, practices and conditions which are contributing to good physical, mental, emotional and social growth of children in the community and those which are blocking optimal growth.

Procedure

(a) The participants make a list of items to observe and/or discuss with family members. This can include items such as:

- How many members of the family are there? What are their ages, sexes, educational levels, and the relationship of the different members to the head of family?
- What type of house, compound and farm does the family have?
- What are the conditions of the home and compound?
- What does the family grow? What animals are kept?
- How healthy are the children?
- What materials do the children have for play?
- What specific practices are followed in the family in regard to control of children, discipline and rewards?
- What are the parents' occupations?
- What do the pre-school children do when the parents are working?
- How much time do the mother, father, older children or other relatives spend playing with or encouraging the pre-school children?
- How do the children of different ages behave in the home?
- Do the children play with children from neighbouring homes? Are they active?

Talking about the children

- What do the children like doing best?
- Do the children like helping around the house?
- What are the food likes and dislikes of the children? Who gives the children their various meals? Who do they eat with? What do they eat?
- What language is spoken at home?
- Do the children take part in any community activities?
- Other relevant questions according to the country and culture.

(b) Each participant visits a home, being introduced by someone the family trusts, to observe and to talk to the parents (separately if possible) to find out some of the answers to the agreed questions. The discussion should be informal and the parents' views, practices and problems with regard to their families should be sought. If possible, the conversation should be recorded on a tape recorder. This has proved possible and useful for family visits in some African countries. The permission of the family must be sought but often people are interested to hear their voices recorded.

(c) Collation of findings of members of the group and discussion of the implications. The tapes are played and the responses discussed.

7.2 Case studies on the reasons behind malnutrition

A similar type of case study exercise can be used to try to identify the causes of malnutrition in a family.

Objective

To find out the reasons, direct and indirect, behind cases of malnutrition in the community.

Procedure

(a) As in the exercise on child development, the participants draw up a list of points, relevant to the particular circumstances and culture, which may be related to child malnutrition in the area. The lists on pp. 100–104 may be of help in the preparation of such a list.

(b) The families of children with malnutrition are identified through the clinic. Each participant, or pair of participants, is alloted a family and, during one or more visits, the participants find out, through conversation and observation, as much as they can about the reasons why one or more children in the family is/are malnourished. Again, a tape recorder can be used if available and not offensive to the families.

(c) If the course is long enough, the participants can follow up their families, after consultation with the clinic staff, to try to help them to overcome the causes of the malnutrition. This has been done success-

fully in health programmes in several countries. It may involve getting in touch with agriculture, veterinary, community development, home economics or welfare personnel working in the area to obtain expert help for the families in solving some of their problems.

(d) The participants can present periodic reports on the progress of their families at class seminars during which they discuss the problems arising and make suggestions for solving them. For these seminars, each participant can prepare a visual presentation which explains the circumstances and records progress.

7.3 Preparation of prototype simple play material which can be duplicated by parents or used by children in play

Objectives

That participants find materials in the neighbourhood from which play equipment can be made which will encourage physical, mental, emotional, and social growth in young children; and that participants are able to make play materials and equipment from these.

Procedure

(a) Participants search the neighbourhood for materials with which to make toys or play equipment and to find materials children can play with.

Examples are[1]:

- for climbers: pieces of wood to nail to the trunk of a tree, and sisal rope to lash them securely;
- for obstacles for climbing through: old worn tyres can be nailed to a piece of wood, side by side to provide a tunnel for children to crawl through; wooden boxes with the top and bottom removed or any other objects which can form a tunnel can be used;
- for a see saw: a long plank and a large log;
- for a skipping rope: rope made from sisal fibres;
- for building blocks: wood cut to careful measurements, or small milk or cigarette cans with sharp edges well hammered and smooth;
- for puzzles: old magazine pictures or posters to stick onto thin wood or strong cardboard. These can be cut into small or large pieces according to the ages of the children who will use them;
- for pasting collages: seeds, shells, leaves, and other objects to paste onto paper (old newspaper or old mimeograph paper from local offices will do if nothing else is available);
- for making paste: wheat or cassava flour for boiling with water;

[1] Adapted from *Play and Play Equipment*, Ulla Lofgren, FAO, Rome, 1974.

- for making paints: local roots, leaves, stones (curry, indigo, henna), charcoal, ash and others known locally;
- for paint brushes: grass or sticks;
- for building cars, aeroplanes, trucks, houses: pieces of sisal stalk, corn and millet straw, pulp of reeds, thorns for fixing pieces together;
- for wheels: empty sewing spools (reels) and bottle tops;

Many kinds of toys can be made from natural materials and junk found around villages

- for building boats: coconut shells or baobab fruits;
- for modelling: clay from the ground or papier maché made from old paper, water and flour paste;
- for a sand tray: planks for edges, sand, old tins for carrying water and to use as moulds;
- for paper-folding: old paper, to make hats, aeroplanes, windmills, boats;
- for weaving: palm leaves;
- for sewing: old sacks and raffia (a large needle will be required);
- for making music and rhythm: calabashes, coconut shells, gourds, bamboo sticks and pieces of old metal to make rattles, maracas, flutes, violins, rhythm sticks, triangles and cymbals;
- for songs, dances, stories: collect local traditional ones or write new ones;
- for dolls and for playing at houses and families, or other imitative play: old pieces of cloth stuffed with rags for heads and hands; corn stalks, banana stalks; scraps of worn-out cloth or waste pieces from the local tailor to make clothes; paint to mark in hair, eyes and other features;
- for puppets: papier maché; clothes from scraps of cloth;
- for play kitchen and home equipment: plates, pots, cups, spoons from small gourds, coconut shells and calabashes;
- for necklaces and bracelets: seeds of all kinds;
- for building houses or for storing things: old packing cases, crates or cartons;
- for masks: paper bags (sacks).

(b) Participants each make one or two toys, pictures or collages for use in an exhibition for families or to test in a local day-care centre.

(c) Participants discuss the use of the toys and the ages of children for which they are suitable.

7.4 The roles of family members in relation to child development and growth

Objective

To identify the participants' personal attitudes, practices, values and goals related to the rearing of children and to family size; and the group view of the relationship of these to family life and to the growth and development of children.

Procedure

(a) Each member of the group prepares a short note on the social roles of men, women and children in his or her own family (including the

extended family where it exists), or in a family with which he or she is well acquainted (if this makes it easier because it is less personal).

Such a note could include:

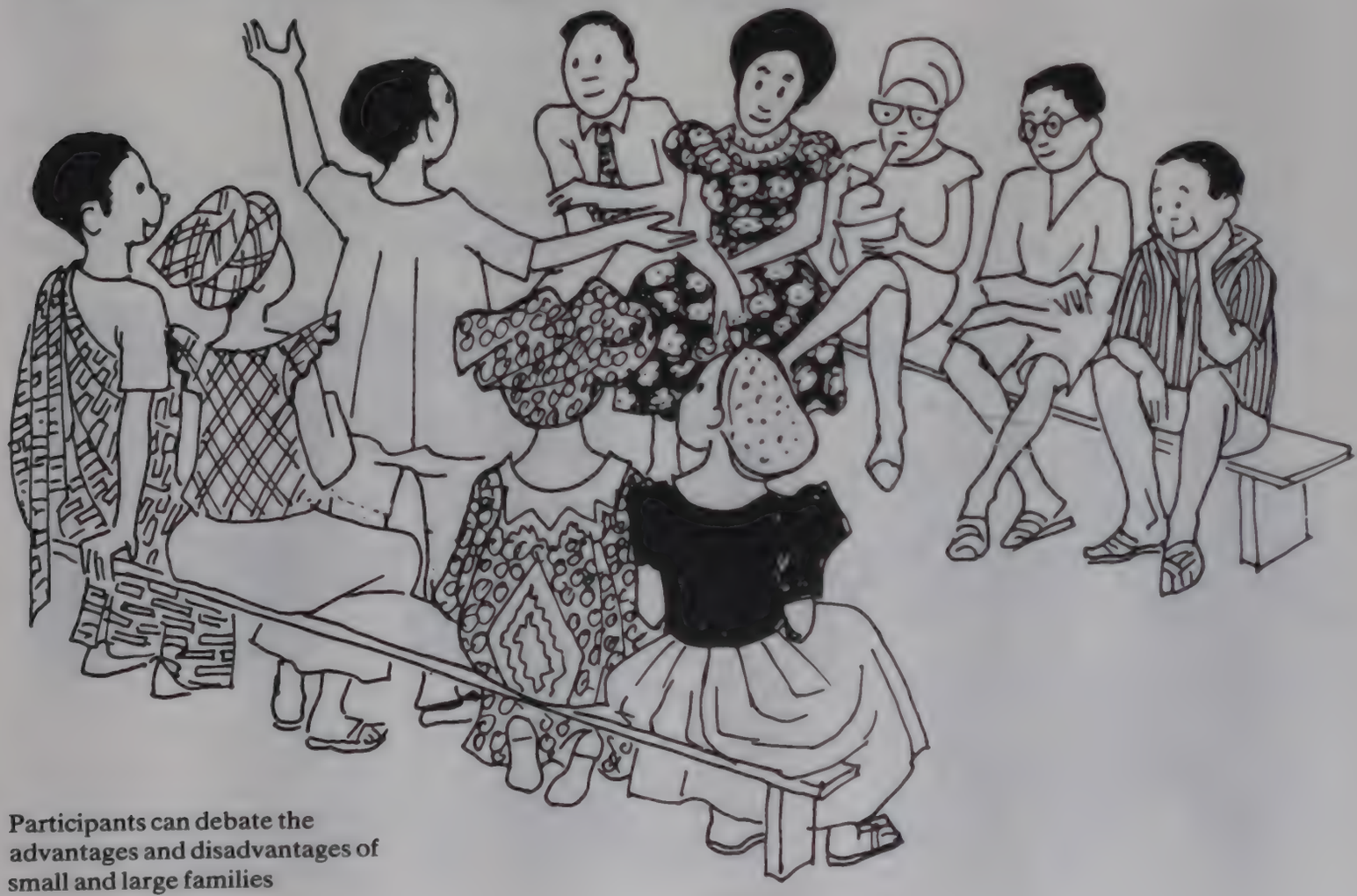
- how decisions are reached about various different matters in the family; communication within the family;
- the positions, roles, status, expectations and aspirations of the different members of the family;
- how the family meets its needs for food, clothing, shelter, education, socialization and control of the young;
- the tasks of each family member; division of labour;
- family history; changes over the years; changes in family practices; effects of modernization.

These notes should include personal feelings about various points, and basic personal values and goals (if the group members know each other well enough or feel secure enough to give personal view points).

(b) Informal presentation of the notes made by members of the group and general discussion.

(c) Role-playing (acting out) some of the issues which have been identified during the discussion with members of the group assuming the roles of family members, to illustrate family processes in action.

(d) Discussion of the implications of the patterns identified for the growth and development of children.



Participants can debate the advantages and disadvantages of small and large families

7.5 Small versus large families

Objective

To identify the advantages and disadvantages of small and large families.

Procedure

(a) Divide the participants into two. One group studies the advantages of large families and the other of small families (within the culture concerned).
(b) Arrange a debate between the two groups of participants, one in favour of small families, the other in favour of large ones.
(c) Participants summarize the points made in the debate into an essay.

7.6 Stretching the family budget

Objective

To see whether the low-income or medium-income families in a community can meet the calls on their resources.

Procedure

(a) The participants determine the money income (from wages or farm or business) of one or two typical families of average size (with parents still at child-bearing age and children below 14 years) in a

Can local families give their children a good start in life? How far can their resources stretch?

community. These families could include, for example, a wage-earning worker in a village such as a builder's labourer or a shop assistant or an employee in the local butchery, and a small farmer; estimate the family's other material resources (food from the farm, home-made bricks from clay, home-woven cloth, etc.).

(b) They discuss and list the essential expenditures monthly (for the wage earner) or yearly (for the farm family), for rent, food, fuel, light, clothing, medicine, school fees (if charged), cleaning materials, taxes, transport, assistance to other family members and others, and compare these with family resources; determine whether the family can afford to give their children a good start in life.

(c) They estimate the additional costs to the family if two extra children are born; estimate the possibilities of increasing family resources to meet the additional costs.

7.7 When is a family too large? Preparation of a teaching aid

Objective

To provide a teaching aid for motivating parents to balance family size and resources. It can demonstrate that a family is too large when its resources cannot meet the needs of the number of children the parents produce.

Procedure

(a) The participants list, from previous exercises, the blocks in child growth and welfare and in the development and prosperity of a family if its needs exceed its resources. These can include effects on food availability, health of mother and children, clothing, education,

Participants can prepare a teaching aid which illustrates the effects on health and welfare of constant child bearing

housing, home amenities, land available, land inheritance, savings, investment on improved farming, jobs, and others applicable in the particular circumstances of the community.

(b) The participants divide into pairs. Each pair produces a simple drawing with a caption which illustrates the results, on a different aspect of family life, of having too many children with too few resources. They prepare brief texts to go with their drawings.

(c) If one participant draws well, he or she can re-draw the pictures on stencil (blue drawing stencils if these are available) so that each drawing in the series is in the same style. The texts can be typed and the booklet duplicated for testing as an educational tool by the members of the course or workshop, either during their training or when they return home.

7.8 Recording the growth of children

Objectives

That all participants are familiar with the type of clinic weight record card used in the country or area, know how to plot growth curves, and can explain about the cards to parents.

Procedure

(a) The participants visit a clinic or school/day-care centre and learn from a nurse or doctor how to weigh babies and pre-school children accurately.

(b) They each plot the weight of one or two children on the 'road to good health' chart.

(c) They plot the weight-for-age of a group of under-5 children, weighed that day, on a 'road to good health' chart.

(d) If the data is available they divide the children weighed that day into those from families with more than 3 children and those with 3 or less and plot the weights-for-age again on two separate graphs, the families of more than 3 children on one graph and the small families on another. From this it will be possible to see whether the children of large families grow as well as those from small families.

(e) They divide the children into those born 18 months or more after their older brother or sister and those born less than 18 months apart. They plot the weights-for-age of the two groups separately.

(f) They discuss the meaning of the curves and results.

Note: This is a simple kind of research. In some cultures and economic groups, neither the size of the family nor the spacing of the children may make a difference to growth. In others, one or both of these may make a difference. The class should carry out this practical exercise with an open mind.

Participants learn how to weigh children accurately and plot their growth on 'road to good health' charts

7.9 Measuring the arm circumference of children aged 1–4

Objective

To learn to use the arm circumference of pre-school children aged 1–4 (between their first and fifth birthdays) as a way of estimating whether the young children in a community are adequately nourished or undernourished.

Procedure

(a) The participants visit a clinic or nursery school or day-care centre to learn from a nurse or doctor how to measure arm circumference in pre-school children between their first and fifth birthdays, using the techniques described on p. 36.
(b) They each make a measuring strip, marked out as shown on p. 36 for easy use in taking this measurement. An old X-ray plate (get the hospital to clean off the dark shadows) marked and coloured as described on p. 37 and cut into narrow strips, makes many very good measuring instruments, but non-stretch tape measures can also be used, or pieces of non-stretch nylon cord.
(c) They measure the arm circumference of all the children in the centre or clinic that morning and calculate the percentage of the children who are well nourished (as estimated by this measurement), the percentage slightly undernourished and the percentage which can be considered dangerously malnourished.
(d) They discuss the findings of this small study in relation to factors which might affect the nutrition of the children.

7.10 Calculation of human energy and nutrient requirements

Objective

Participants to be able to use a table of energy and nutrient requirements as a baseline against which to measure intakes of families, individuals, and groups in schools or institutions.

Procedure

Participants use the table of requirements of energy and nutrients (Appendix 1) to calculate the daily calorie and protein requirements of the members of a family consisting of:

father, age 38, weighing 65 kg

mother, age 34, weighing 55 kg
baby, 8 months, weighing 8 kg receiving 400 ml breast milk plus supplements
boy, age 10, weighing 32 kg
girl, age 8, weighing 26 kg

Family members are normal weight and the parents do a moderate amount of work. The children are in school. Requirements vary with age and sex, and, for infants, body weight (see p. 160).

The method to be used is as follows:

(a) For the man of 38 years weighing 65 kg:

- select the correct age and sex group in the left-hand column of the table;
- read off the daily *calorie* requirement for this man from column 2, that is 3000 calories;
- read off the daily protein requirement for the man from column 3, that is 62 g.

(b) For the woman of 34 years weighing 55 kg:

- select the correct age and sex group in the left-hand column;
- read off the daily calorie requirement for this woman from column 2, that is 2200 calories;
- read off the daily protein requirement for the woman in column 3, that is 48 g.

Note: If a baby is breast feeding it is difficult to separate the requirements of mother and baby. It has therefore become a convention that when the baby is less than 6 months old (that is, living mostly on breast milk), the extra requirements for lactation are added to the mother's requirements. When the baby is over 6 months, and receiving a mixture of supplements and breast milk, the requirements for lactation are incorporated in the baby's requirements. Therefore, as the baby of this woman is 8 months old, she has not been given the lactation allowance as this is included in the baby's requirements. In practice, in meeting these requirements, the mother who is still lactating will need extra food to provide the daily 400 ml of milk but for calculating requirements the convention can be followed, although some of the calories and protein will go to the mother. Therefore it is necessary to calculate the 8-month old baby's requirements and to add these to the family's requirements.

(c) Baby 8 months old weighing 8 kg, receiving 400 ml breast milk per day:

- select the correct age in months from the infant's list in the left-hand column;
- read off the calories required per kg body weight, that is 110 calories. Multiply this by the body weight, $110 \times 8\ \text{kg} = 880$ calories needed daily;

- read off the protein requirement per kg body weight, that is 2.03 g. Multiply this by the weight of the baby, 2.03 × 8 kg = 16.24 g of protein needed daily.

To find out how many calories and how much protein each supplementary meal for the baby should contain:

- divide the 400 ml breast milk by 4, that is 100 ml per meal;
- divide the baby's requirements for calories and protein by 4 to get the requirement for each meal, 880/4 =220 calories required per meal. 16.24/4 =4.1 g protein required per meal (correct to a decimal place);
- breast milk gives 67 calories and 1.1 g of protein per 100 ml (see Appendix 2);
- there each supplementary meal should contain:
  calories 220 − 67 from breast milk = 153 calories
  protein 4.1 − 1.1 g from breast milk = 3 g protein

(d) A boy of 10 years weighing 32 kg:

- select the correct age and sex group from the left-hand column;
- read off the daily calorie requirement for a 10-year old boy, that is 2600 calories;
- read off the daily protein requirement for this boy, that is 50 g.

(e) A girl of 8 years, weighing 26 kg:

Note: The requirements for boys and girls are the same up to 12 years.

- select the correct age group from the left-hand column;
- read off the daily calorie requirement for an 8-year old child, that is 2190 calories;
- read off the daily protein requirement for this child, that is 41 g.

(f) The family requirements per day are given below:

	Calories	*Protein* (g)
Father	3000	62.0
Mother	2200	48.0
Baby	880	16.2
Boy	2600	50.0
Girl	2190	41.0
	10870	217.2

These figures can later be used to check if the family food is adequate and for planning food supplies. Similar calculations can be made for groups or populations.

It is useful to be able to calculate the calorie and nutrient requirements of individuals, families, groups and even populations, as this information is essential for good meal planning, food supply and agricultural planning

7.11 Calculation of calories and nutrients in food

Objective

Participants to be able to calculate the calories and grams of protein supplied by different foods so that they can compare dietary intakes with requirements to estimate the adequacy of diets.

Note: Only calories and proteins are included in this exercise as the method of calculation for protein can be used for other nutrients, and because African diets which are adequate in calories and protein are usually adequate in other nutrients. Possible exceptions are vitamin A and vitamin C in arid regions. If deficiencies of these vitamins or other nutrients are suspected, the dietary intake of the particular nutrients can also be calculated.

Procedure

Using the table of composition of foods per 100 g edible portion (Appendix 2), participants calculate the calories and protein from a given amount of food as below.

(a) Find the food in the 'Food' column on the left of the table. Usually tables begin with cereals; then starchy roots, tubers and starchy fruits; pulses (grain legumes), nuts and seeds; vegetables; fruits, sugars and jams, meat, poultry and fish; milk and milk products and eggs; fats; and then miscellaneous items. If you become familiar with this order you will find the food you want easily, as within each group the foods are listed alphabetically.

(b) Read off the calorie value of 100 g (edible portion) of the food from the table column headed 'Calories' (or Food Energy: Calories, or Kcals, depending on the tables being used).

(c) Divide this number of calories by 100 to give the calories from 1 g and multiply by the grams of food for which you want to know the value.

(d) Read off the protein per 100 g (edible portion) of the food from the table column headed 'Protein'.

(e) Divide the grams of protein by 100 to give the protein from 1 g and multiply by the grams of food for which you want to know the value. In this case the answer will be in grams.

Example

Find the calories and protein value of 60 g of banana (edible portion).

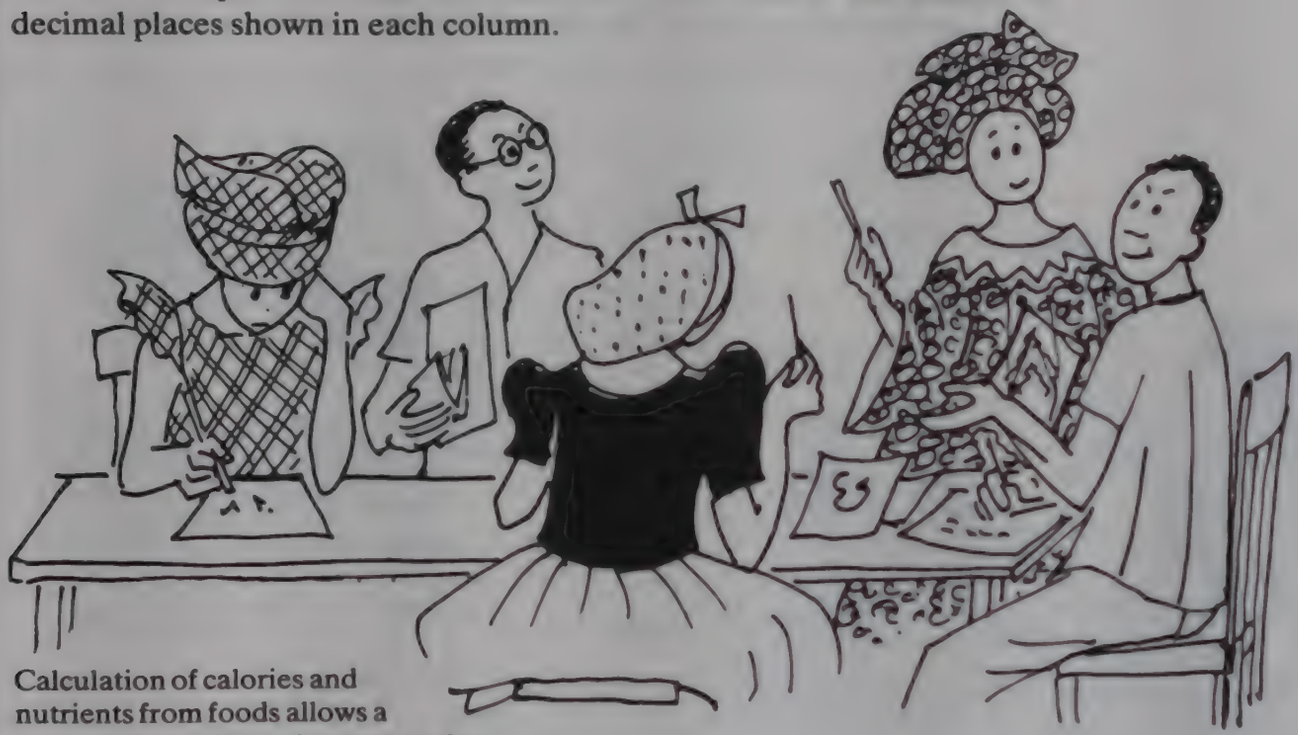
- Find 'banana' in the table under starchy roots, tubers and fruits. Read off the calories per 100 g, that is 88 calories.
- Calculation of calories: If the calories per 100 g edible portion of banana (read from the table) = 88, then calories from 60 g $= \frac{60 \times 88}{100} = 52.8$ calories.

However, we do not count beyond the whole numbers of calories as our weighing is not accurate enough to justify decimal points. So this would be corrected to 53 calories.

- Calculation of protein content: Read off the protein value of 100 g of banana from the column headed 'Protein', that is 1.5 g.
- If the protein from 100 g of edible portion of banana is 1.5 g then the protein from 60 g $= \frac{60 \times 1.5}{100} = 0.9$ g.

Note: In this case we correct the answer to one decimal place. *If* the answer had been 0.87 we should have corrected it to 0.9 g.

Other nutrients are expressed in milligrams or micrograms so it is important to read at the top of each column the measure in which each nutrient is expressed. Answers should be corrected to the number of decimal places shown in each column.



Calculation of calories and nutrients from foods allows a comparison with requirements to be made

7.12 To find the original weight of the food which needs to be purchased to provide a given quantity of edible portion of the food

Objective

To enable participants to know how much food needs to be purchased or brought from the farm to provide a given amount of edible portion to be used in planning a diet.

Note: Most tables of food composition available to participants give values for 100 g *edible portion* of food. They also give a column at the end entitled 'refuse in as purchased weight', in which the wastages taken off from the food in preparing the edible portion are given in percentages.

Using these figures it is possible to calculate the original weight of the food purchased in order to get a specific quantity of *edible portion* of the food.

Procedure

(a) Find the food in question in the table of composition of foods per 100 g edible portion (Appendix 2).
(b) Calculate the percentage of the food 'as purchased' which is edible by subtracting the figure on the 'refuse' column from 100.
(c) Multiply the quantity of edible portion of this food by 100 and divide by the percentage of edible portion (found by (b) above). This will give the amount of 'as purchased' food needed to provide the quantity of edible food we are using.

In planning diets we need to know the approximate weights to purchase to get the amounts of the ingredients we need

Example

If we want to know how much banana to buy to give 60 g edible portion (see 7.11), we do the calculation as follows:

- The refuse taken from banana as purchased is 32 per cent (read from the table).
- Therefore 100 g of 'as purchased' banana gives us (100 – 32) g, that is 68 g edible portion.
- Then 60 g of edible banana is got from $\frac{60 \times 100}{68}$ = 88 g as *purchased weight.*

  Note: To save calculating the 'as purchased' figure for every quantity of banana from the start, we can make a calculation of the '*as purchased*' weight of 100 g of edible banana and write this in the margin of our table. This is done by the following calculation.
- 100 g of edible banana = $\frac{100 \times 100}{68}$ = 147 g as purchased.
- Therefore 1 g of edible banana comes from 1.47 g as purchased.
- This means that whenever we have a quantity of edible banana for which we want to know the 'as purchased' weight we can multiply our quantity by 1.47.
- Therefore 60 g of edible portion of banana has an 'as purchased' weight of 60 × 1.47 = 88 g (corrected to the nearest gram).

The menus for the family meals must coincide with the family income

7.13 Preparation of family meals; calculation of adequacy to meet requirements; discussion of cost and suitability

Objectives

That participants are able to design meals for a family or group; calculate the nutrient value of the meals; compare this with the family or group requirements; and estimate the suitability of the menus and food in terms of cost, palatability and acceptability.

Procedure

(a) Participants are divided into 4 groups, and each group is given an assignment to design, prepare and cost a meal which will meet the calorie and nutrient requirements of the family described in 7.10, for which the calorie and nutrient requirements have already been calculated as given in the table below.

	Requirements	
	Calories	Proteins (g)
man, 38 years, 65 kg	3000	62.0
woman, 34 years, 55 kg	2200	48.0
baby, 8 months, 8 kg (receiving 400 ml breast milk per day)	880	16.2
boy, 10 years, 32 kg	2600	50.0
girl, 8 years, 26 kg	2190	41.0
	10870	217.2

	Proportion of day's requirements to be met by the meals
Group 1 will design and prepare breakfast for the 4 older members	$\frac{1}{5}$ of daily requirements
Group 2 will design and prepare lunch for the 4 older members	$\frac{2}{5}$ of daily requirements
Group 3 will design and prepare supper for the 4 older members	$\frac{2}{5}$ of daily requirements
Group 4 will design and prepare 4 supplementary meals for the baby	Total daily requirements divided into 4 supplements (taking the nutrients supplied by breast milk into account)

The family has an income equivalent to that of a moderately low-income worker in a small town in the area (but not poverty-stricken or unemployed). The actual amount should be decided by the participants together.

(b) Each group prepares a list of equipment and ingredients needed for the preparation of the meal(s) they have been assigned. On the appropriate day, the equipment on the lists will be supplied by the course organizers. Foods requested, with quantities purchased and costs, will be provided for the group by the organizers assisted by a few participants.

(c) On the day of the practical, each group will:
- weigh the different foods they are going to use in cooking (as purchased weight) and work out the costs of these quantities from the lists of actual costs and weights bought;
- prepare the ingredients for cooking and again weigh each (after they have skinned or peeled or otherwise prepared them) as raw edible portions. Then make a note of each *edible portion* weight against the *as purchased* weight with which they started;
- cook the meal;
- while the food is cooking, calculate the calories and protein which the meal will give and compare it with the family's (or baby's) requirements; calculate the cost of the meal from the cost of the *as purchased* foods used;
- serve the meal (or supplements for the baby) on a table.

(d) The participants discuss the meals produced from the points of view of:
- the total calories and protein provided for the day compared with the family's (or baby's) requirements;
- the cost in relation to income; the equipment and fuel needed in relation to the realistic amount that one would expect a family to be able to afford;
- appearance and taste (participants sample the foods);
- bulk to be eaten (especially for the baby);
- how the meals should be divided among the family members.

7.14 Bulk in young children's food

Objectives

To determine whether a child of about 1 year who is receiving 300 ml breast milk and otherwise being fed almost exclusively on thin porridge, can get enough calories from his meals. As mothers often give only thin porridge as a supplement to breast milk to children of this age, to determine how much porridge the 1-year-old child would need to eat to meet his requirements.

Procedure

(a) The participants read from the requirements daily table (Appendix 1) the calorie needs of a child of 12 months and subtract the calorie value of 300 ml breast milk, thus finding out how many calories the porridge should supply.
Note: The breast milk gives about 200 calories. From the requirement table, Appendix 1, we can read that the child requires about 1180 calories daily. Therefore the porridge has to supply 980 calories daily.

Too much water in the young child's porridge cuts down the food he receives

(b) Calculate how much maize flour is needed to give 980 calories.
Note: Maize flour gives 368 calories per 100 g. Therefore to have 980 calories, $\frac{980}{368} \times 100 = 266$ g of maize flour are needed.

(c) Prepare a thin porridge from the amount of maize which gives 980 calories (266 g maize flour).

(d) Measure its volume in a measuring cylinder.

(e) Put the porridge into 3 plates and discuss whether the child of 1 year old could eat that much at 3 meals daily (as well as the 300 ml breast milk).

(f) Discuss how the bulk can be reduced and the nutritional value improved by:
- cooking with less water;
- substituting legume flours and other high-calorie, protein-rich foods for some of the maize flour;
- giving the child protein-rich biscuits (7.17) at one or more of the meals.

7.15 Best food buys

Objective

That participants know how to get the best value, in terms of calories and nutrients, from food available in the local market, so that they can advise families wisely on the best use of their resources.

Procedure

(a) The participants divide into small groups and each small group is given some money to go to the market. Each group buys samples of the particular kind of food assigned to it, for example:
Group 1 buys meats and fish of different kinds;
Group 2 buys all the different kinds of legumes, seeds and nuts available;
Group 3 buys fruits and vegetables;
Group 4 buys all kinds of cereals, sugar and jam (if sold);
Group 5 buys fats, oils, milk and eggs, cheese.

(b) Each group weighs all the foods it has bought and their weights 'as purchased', with prices paid, are listed by the groups.

(c) They peel, or otherwise prepare each food into edible form, as necessary, and weigh the edible portions of each. These weights are entered next to the prices paid.

(d) Using the table of composition of food per 100 g of edible portion (Appendix 2), the group calculates the weight of edible portion of each food which gives 1000 calories; and also the weight of edible portion of each food which gives 20 g of protein.

Note: 1000 calories and 20 g protein are taken as handy units of calories and protein for comparison purposes.

(e) From the known price paid for a given weight of food 'as purchased', the cost of 1000 calories and of 20 g of protein are calculated for each food.

Example

Calorie cost

- A participant bought 500 g of sweet potato leaves for 60 cents.
- 500 g (as purchased) sweet potato leaves give 400 g edible portion because 20 per cent is refuse (see table, Appendix 2).
- But if 400 g edible portion cost 60 cents, then 100 g edible portion cost $\frac{60}{4} = 15$ cents.
- If 100 g give 49 calories (read from table), then 1 g gives $\frac{49}{100} = 0.49$ calories.
- Then 1000 calories are obtained from $\frac{1000 \times 1}{0.49} = 2040$ g.
- But if 100 g cost 15 cents (see above) then 2040 g (1000 calories) cost $\frac{2040 \times 15}{100} = \$3.06$.

Protein cost

- 100 g of sweet potato leaves edible portion give 4.6 g protein.
- Therefore 1 g gives $\frac{46}{100} = 0.046$ g of protein.
- Then 20 g of protein are obtained from $\frac{20 \times 1}{0.046} = 435$ g of sweet potato leaves.
- But if 100 g of leaves cost 15 cents then 435 g (20 g of protein) cost $\frac{435 \times 15}{100} = 65.2$ cents, that is 65 cents corrected to the nearest cent.

(f) Participants make a chart showing the cheapest sources of calories at the top, and the dearest at the bottom. Such a chart can take many forms. One might be in the form shown in the table below.

Food	*Cost of 1000 calories (example only)* ($)	*Weight*	*Quantity in local measures*
Maize flour	0.05	250	(to be added for the country)
Cassava	0.07	600	
Milk	0.20	1560	

This could be illustrated with pictures.

(g) Participants also make a similar chart showing the cost of 20 g protein from different foods, in ascending order with the cheapest at the top.

(h) They discuss these charts and then design low-cost local menus which will meet a family's calorie and protein requirements, taking into account that the menu must contain a mixture of foods to make sure that the proteins help each other out.

Note: If the diet is adequate in calories and protein, its adequacy in vitamins and minerals can be made certain by including good quantities of green leafy vegetables, or yellow fruits and vegetables, always assuming that the children of the family are allowed to play in the sunshine to be sure of enough vitamin D.

This is a useful exercise for the participants at a workshop or course, so that they know how to investigate this subject in the areas where they work. The best value for money may, of course, vary with the season so it must be made clear to participants that such a study in their own area needs to be repeated at different times of the year. From this, a calendar of 'best buys' can be developed.

Knowing 'best buys' in the local market is important background for advising families

Learning Experiences 16–19

Preparation of high-protein/high-calorie dishes suitable for weaning and pre-school children.

Objectives

That the participants are able to prepare, and to teach families how to prepare, dishes rich in energy and protein which are suitable for weaning infants, toddlers and children in general.

Note: We have talked about the need for concentrated foods of low water content for toddlers and young children because of the problem of bulk in their diet; and for soups and stews rich in energy and protein to be combined with porridges and starchy foods in the meals for weaned children. Older children will also benefit from eating foods rich in calories

and protein. Pregnant and lactating women do not, in some cultures, eat a fair share of animal protein foods from the family meals as these largely go to men; such women need good sources of vegetable proteins which are not traditionally denied to them.

Good practical exercises, therefore, are the experimental preparation of high-calorie/high-protein foods, either from recipes provided to the participants or from ones they know or make up themselves, using local foods which are easily available and comparatively inexpensive.

We have included 4 such learning experiences in our suggested practical exercises. All these dishes have been prepared in courses and workshops, by men as well as women, and the results have been palatable and the costs generally low.

Procedure

The following procedure should be followed for all the food preparation exercises.

(a) The participants are divided into small groups and each group prepares and cooks one or two high-protein/high-calorie dishes.

(b) During this preparation, they record:
- the weight of each ingredient used;
- the number and average weight of pieces obtained (if appropriate, such as biscuits);
- the weight of the total cooked dish (if this is including the pot or plate, subtract the weight of the pot or plate);
- the cost of the ingredients.

High-protein foods are good for weaning children

(c) From the weights of the original ingredients and the weight of the cooked dish, the participants work out the *protein* and *calorie* value of 100 g of cooked dish, using the food composition table, Appendix 2. From this the protein and calories obtained from each piece or serving can be calculated.

(d) In a similar way the *cost* per 100 g of cooked dish, and also per piece or serving, per 1000 calories, and per 20 g of protein, can be calculated (see 7.15 on best food buys).

(e) The participants discuss how these dishes could be used to improve children's meals; which of the dishes are the best value for money; and at what ages children could digest them.

All these recipes can be made for the family and, if well-cooked and without much pepper, can be taken from the family pot for the infants or toddlers.

The column for cups, spoons, local and handy measures has been left blank. This can be completed by trainers in each country as the size of cups and spoons vary greatly from place to place, and handy measures may be milk or cigarette tins, metal dishes or many other types of container.

7.16 Preparation of moinmoin, akara balls, groundnut soup, beans and corn relish and cassava cheese

Each small group of participants prepares some of the following dishes:

Moinmoin (Origin: West Africa)

Ingredients	*Grams*	*Ounces* (approximate)	*Spoons, cups, or handy/local measures*
Cow peas (black-eyed peas)	100	3½	
Dried fish or 1 hard-boiled egg	25	1	
2 small tomatoes	50	1¾	
1 small onion	45	1½	
Red palm or other cooking oil, warmed	25	1	
Pinch of salt			
Leaves for wrapping			

Note: One or two small hot chili peppers may be used if wished, for the family, but not for babies. Moinmoin without pepper is a good supplementary food for infants after they have got used to porridges (about 9 or 10 months) as it is smooth, easily digestible and cooked by steaming.

Preparation

1. Soak the cow peas overnight, rub off the skins and pound or grind the cow peas finely. The long soaking softens the cow peas and makes cooking easier. Mix the paste with a little warm water to make a batter of pouring consistency.
2. Lay some small sticks across the bottom of a pot. Put enough water in the pot to reach just the top of the sticks. Bring to the boil.
3. Grind the tomatoes and onion.
4. Mix all the ingredients together. If chili peppers are used, remove the seeds, chop them finely and add to the mixture. Remember, peppers should not be added to moinmoin for infants and young children.
5. If dried fish is to be used, soak and cook it, remove the skin and bones, then pound or grind it finely and add to the mixture. Dried fish powder (see p. 91) could also be used. If hard-boiled egg is used, chop it in small pieces and add it.
6. Divide the mixture into individual portions, wrapping each in a leaf (banana, or other large leaf commonly used for wrapping food) or place the mixture in a bowl or aluminium dish and cover with paper tied on securely.
7. Place the wrapped bundles on the sticks in the pot of boiling water; cover with a lid or with plenty of large leaves; steam gently till well cooked and set. *Note:* If the mixture is steamed in a container it is divided after it is cooked.
8. Serve with the child's porridge or as part of the family meal.

Akara balls (Origin: West Africa)

Ingredients	*Grams*	*Ounces* (approximate)	*Spoons, cups, or handy/local measures*
Cow peas	150	5	
Cooked dried fish (if available)	35	1¼	
A small onion	35	1¼	
Pinch of salt			
Oil for frying (red palm oil or cooking oil)			

Preparation

1. Soak the cow peas overnight, rub off the skins and grind the cow peas.
2. Grind the onion.
3. Remove skin and bones from the cooked fish. Pound or grind.

4. Mix the cow peas with the pounded fish (if used), onion and salt, adding a little water to make a stiff dropping consistency. *Note:* With some kinds of cow peas it may be necessary to bind the mixture with a little wheat flour but this is not necessary normally.
5. Drop small spoonfuls into really hot fat and fry till light brown and crisp outside.
6. Serve to the family with their staple dish, or to young children as a snack (but not to very young infants who would find the fried food difficult to digest).

Groundnut soup (Origin: West Africa)

Ingredients	*Grams*	*Ounces* (approximate)	*Spoons, cups, or handy/local measures*
Roasted skinned groundnuts	130	4½	
Dried fish or fresh (if available)	70	2½	
7 small tomatoes (or fewer large)	135	4½	
1 medium onion	70	2½	
8 handfuls green leafy vegetables (garden or wild)	400	13½	
Red palm oil or other cooking oil	40	1½	
Pinch of salt			
Water	about ½ litre	17 (1 pint or a little less)	

Preparation

1. Grind or pound the roasted skinned groundnuts finely, mix to a smooth thin paste with a little water.
2. Soak the fish if dried. Remove the skin and bones from the fish and grind, pound or cut into small pieces.
3. Grind the tomatoes and onions together.
4. Wash and cut up the green vegetables, removing the coarse parts.
5. Boil the water and add to it all the ingredients and stir well.
6. Boil very gently till everything is cooked.
7. Serve with the main food as a relish or soup. For a small baby it should be passed through a sieve or strainer to remove any coarse parts.

A bean and corn relish (Origin: East Africa)

Ingredients	*Grams*	*Ounces* (approxi-mate)	*Spoons, cups, or handy/local measures*
Beans	300	10½	
Boiled corn from the cob	120	4	
Green sweet peppers	60	2	
Onion	30	1	
Cooking oil	60	2	
Tomatoes	60	2	
Dried fish or fresh fish	250	8½	
or			
Minced meat	250	8½	

Note: 3 g of chili pepper (a large pinch) finely chopped may be added if desired but not if the dish is to be used for young infants.

Preparation

1. Soak the beans and remove the skins by rubbing; boil the corn cobs.
2. Soak the fish if dried; remove the skin and bones of the fish and pound or cut into pieces. Take the corn off the cob. Cut up onions, pepper and tomatoes.
3. Cook beans in boiling water with a little salt; add the boiled corn and cook until soft and pulpy; add more water if necessary.
4. Add oil, onion, tomato, peppers and continue cooking for five minutes; stir to prevent burning.
5. Add fish or meat and finish cooking for 15–20 minutes.
6. Serve hot with main dish.

Note: for babies, strain the mixture.

Cassava cheese (Origin: East Africa)

Ingredients	*Grams*	*Ounces* (approxi-mate)	*Spoons, cups, or handy/local measures*
Boiled sweet cassava	1000	35	
Cheese	100	3½	
Milk	150	5	
Cassava water	150	5	
Ghee or margarine	15	½	
Maize flour	15	½	

Preparation

1. Wash and peel the sweet cassava, cut into pieces and boil until just soft. Drain.
2. Remove any stringy pieces and cut into moderately small cubes.
3. Grate the cheese or chop into small pieces.
4. Melt the fat in a pan, add flour, salt and pepper, stirring well.
5. Gradually add the milk and water, stirring hard to make a smooth sauce and to prevent sticking.
6. When thick, add half the grated cheese and the cassava; stir gently.
7. Pour into a dish, sprinkle the rest of cheese on top, brown in the oven or under the grill.

Note: This dish is suitable for towns or day-care centres, schools and hospitals, where an oven is available. Few rural families have an oven, although in some places traditional clay or brick ovens are used. It has proved very popular in schools and town homes, even in a country where cheese is not a familiar food. Cheese could be made from sheep or goat milk in many places. If no oven is available, put all the cheese in the sauce.

When all the foods are cooked, the participants complete the calculations and discussion as described on pp. 142–143.

7.17 Preparation of high-protein biscuits

Notes

It is possible to make biscuits with a very high content of good quality protein and high calorie content as well, using only raw materials which are readily available locally, or which could be made available if there was a demand. Such biscuits can be of great value as a food supplement, especially for young children, because the water content of the biscuits is low and therefore the bulk is low. This means that young children can eat a comparatively large amount of calories and protein without filling their stomachs too full.

The high-protein vegetable foods available in Africa include soya beans, groundnuts, simsim (sesame, bungu, benniseed), and beans and peas of many kinds. Each of these has a high quantity of vegetable protein of rather lower value than animal proteins. If, however, they are combined, and added to one or more cereals (which also have good quantities of proteins), they provide a protein mixture almost equal to that of animal proteins.

To make biscuits, the materials must be reduced to flours or pastes. Because the pulses (legumes) and oil-seed flours do not have a good binding value it is necessary to use some wheat flour (white or wholemeal), which binds well in addition to providing useful protein. Other cereal flours such as millet or sorghum may also be added. To give the biscuits a light crumbling texture, a small amount of cooking fat or oil must be used. This also increases the calorie value.

It should be borne in mind that the biscuits are especially useful for children from 8–10 months onwards and so the raw materials should be as clean and pure as possible.

Each small group of participants prepares some of dishes described in the following pages.

To make groundnut or bean/pea flour

1. If the biscuits are to be used as a supplement to breast milk or as a weaning food, roast the groundnuts; soak the beans or peas; rub off the skins and dry.
2. Grind or pound the groundnuts (or beans/peas) to a fine flour or floury paste.

Note: the groundnuts must be fresh, clean and bright. Discoloured nuts or mouldy ones must be removed before grinding.

To make simsim flour (sesame, benniseed, bungu)

Simsim is a very fibrous material and it is probably better to omit it from biscuits for young infants. For infants of 10–12 months onwards and for older children and adults, wash, dry and roast the simsim until the seed is easily crushed between the fingers. (Do not over-roast to a dark colour as this will spoil the flavour.) After roasting, pound or grind the simsim to a floury paste.

Mix the flours together ready for baking. There are antioxidants (to prevent oxidation) in the soya which will help to prevent the fat in the groundnuts and/or simsim from becoming rancid.

Three examples of mixtures for biscuits are given below but any of the pulse, oil-seed, and cereal flours can be combined. A small amount of wheat flour should always be included for binding.

Example 1

Ingredients	*Grams*	*Ounces* (approximate)	*Spoons, cups, or handy/local measures*
Soya flour or bean flour or other high-protein flour, such as cow-pea*	30	1	
Roasted groundnut flour	30	1	
Roasted simsim flour	30	1	
Wheat flour	30	1	
Fat or oil	15	½	
Sugar**	15	½	
Baking powder	5		(1 teaspoonful slightly curved on top)
Salt	good pinch		

Example 2

Ingredients	*Grams*	*Ounces* (approximate)	*Spoons, cups, or handy/local measures*
Soya flour or bean flour or other high-protein flour*	30	1	
Groundnut flour	30	1	
Millet flour	30	1	
Wheat flour	30	1	
Fat or oil	15	½	
Sugar**	15	½	
Baking powder	5		(1 teaspoonful slightly curved on top)
Salt	good pinch		

Example 3

Ingredients	*Grams*	*Ounces* (approximate)	*Spoons, cups, or handy/local measures*
Soya flour or bean flour or other high-protein flour*	30	1	
Groundnut flour	30	1	
Millet flour	30	1	
Whole roasted simsim***	30	1	
Wheat flour	30	1	
Fat or oil	15	½	
Sugar**	15	½	
Baking powder	5		(1 teaspoonful slightly curved on top)
Salt	good pinch		

* The soya flour or other high-protein flour may be replaced by the same quantity of groundnut flour (in addition to the groundnut flour already included). Any of the flours, except wheat flour for binding, may be interchanged. Any cereal flour (rice, oat, sorghum, maize) may be used instead of millet flour, depending on availability.

** More or less sugar may be added according to taste in any of these recipes.

*** This gives a different texture but should not be used in biscuits for infants; instead use roasted simsim flour.

Preparation

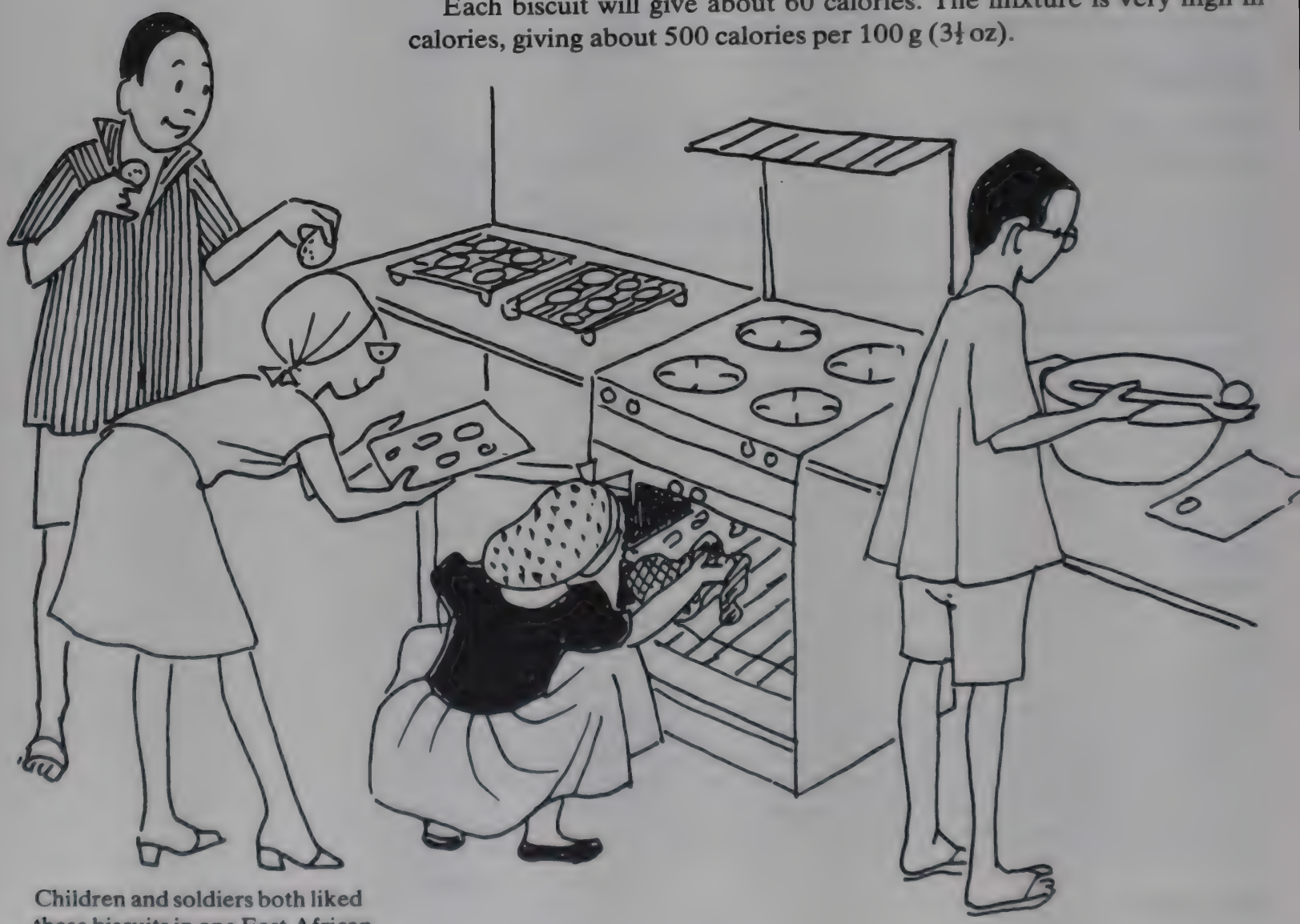
1. Mix the flours and baking powder in a bowl and stir well together. Add the fat or oil and rub in thoroughly until a dryish even-textured mixture is obtained.

2. Add water, one dessertspoonful at a time, kneading well until a dough of plastic but *not sticky* consistency is obtained. (Probably not more than 3 dessertspoonfuls of water will be needed.)
3. Knead for 5 minutes (or longer) to obtain a smooth plastic dough. Roll out to about 3 millimetres ($\frac{1}{8}$ inch) thick; cut into biscuits and place on a greased and floured baking tin. (*Note:* A clean bottle full of water, well-corked, can be used as a rolling pin.)
4. Bake the biscuits in a fairly hot oven about 190–200 °C (375–400 °F) for about 15 minutes watching carefully to be sure that they do not become too dark in colour. They must, however, be fairly hard when taken out of the oven so that they are crisp when cooled.
5. Allow the biscuits to cool, and pack in an air-tight container.

These quantities of mixture will make about 25–30 biscuits of normal size, 12–13 g ($\frac{1}{3}$–$\frac{1}{2}$ oz).

Each biscuit will contain about 20 per cent protein, that is 2.5 g ($\frac{1}{12}$ oz). Two biscuits will give about the same amount and quality of protein as 30 g (1 oz) of meat.

Each biscuit will give about 60 calories. The mixture is very high in calories, giving about 500 calories per 100 g ($3\frac{1}{2}$ oz).



Children and soldiers both liked these biscuits in one East African country where they were made experimentally

These biscuits can be made for day-care centres, schools and hospitals in large batches in an oil or gas or electric oven, or as a cottage industry in a village, using an oil stove or a traditional oven. Some parts of Africa use brick or clay baking ovens in the village and designs for these are available. The biscuits can, however, be baked at home using an oven made from a 5-gallon oil can (debe), over a charcoal pot. Designs for making these ovens are also available. The best kind have a rim of metal fixed round the top so that sand and then charcoal can be placed above as well as below the baking area, giving top as well as bottom heat.

When all the foods are cooked, the participants complete the calculations and discussion as described on pp. 142–143.

7.18 Dishes made from soya bean

Note: The soya bean has the best nutritional value of all the legumes but it can be toxic if not well cooked. If carefully used, it can raise the nutritive value of many mixtures. The following dishes have been cooked experimentally, noting the quantities and time of cooking accurately, and samples of the cooked dishes tested for safety in a university laboratory. If the methods given are followed, the dishes are quite safe for children.

Each small group of participants prepares some of the following dishes.

Soya potato bread or soya matoke (cooking banana) bread (Origin: East Africa)

Ingredients	*Grams*	*Ounces* (approximate)	*Spoons, cups, or handy/local measures*
Mashed cooked sweet potato or matoke (cooking banana)	60	2	
Wheat flour	15	½	
Soya flour	15	½	
Pinch of salt			
Baking powder	4		(1 level teaspoonful)

Preparation

1. Mix with a little water and knead.

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2. Roll out to 3 millimetres ($\frac{1}{8}$ inch) and cook over a charcoal pot on a hot griddle or frying pan or flat platter used for making chapatis or ingera (Ethiopia), turning once, until cooked through and light brown.

Soya fried doughnuts

Ingredients	*Grams*	*Ounces* (approximate)	*Spoons, cups, or handy/local measures*
Soya bean flour	120	4	
Wheat flour	500	16	
Egg	1 small		
Sugar	7	$\frac{1}{4}$	
Baking powder	4 (1 level teaspoonful)		
Oil for frying	250	8	

Preparation

1. Prepare soya flour by roasting soya beans 12–20 minutes (depending on amount) until golden brown; pound or grind and sieve to fine flour (or use commercial soya flour). Cooking time for safety, 12–20 minutes.
2. Mix soya flour and wheat flour.
3. Beat the egg with the sugar until frothy.
4. Mix everything together with a spoon; *if necessary* add water to make doughnut consistency (soft dropping consistency).
5. Fry spoonfuls of the dough in very hot fat until golden brown. Cooking time for safety, 2–3 minutes per batch.

Soya bean milk (Origin: Asia)

Ingredients	*Grams*	*Ounces* (approximate)	*Spoons, cups, or handy/local measures*
Soya beans	500	16	
Water, see preparation			
Sugar (optional)	50	2	
Salt to taste			

Preparation

1. Cover the soya beans with water and soak for 24 hours.
2. Strain off the surplus water and skin the beans by rubbing between the hands.
3. Pound the beans to a soft mash.
4. Measure pounded mash and for every part of mash, add 4 parts of cold water.
5. Bring the mixture to the boil, stirring, and cook gently. Cooking time for safety, 30 minutes after boiling.

Soya bean curd and fried soya bean curd (Origin: Asia)

Ingredients	*Grams*	*Ounces* (approximate)	*Spoons, cups, or handy/local measures*
Soya bean milk (without sugar)	500	16	
Lemons	Depending on size (see below)		
Oil	120	4	

Preparation

1. Squeeze enough lemons to allow 1 tablespoonful of lemon juice per cup soya bean milk. Add the lemon juice to the soya bean milk. When the curd is formed, pour the mixture through a cloth, leaving the curd on the cloth. Cover the curd with another piece of cloth and put a weight on top to squeeze out the water. Leave for about an hour or until it is a nice cheese-like lump. The curd can be cut in cubes and added to soups and stews, for taste and additional nutritional value.
2. Cubes of the curd can also be fried in oil until light brown. Cooking time 10 minutes.
3. Fried cubes can be mixed with cooked vegetables (for example fried or stewed onion and tomato, or cooked green leaves) to form a relish. In this case the curd may be fried for only 5 minutes and then heated up with the vegetables.

Soya bean agaka (Origin: East Africa)

Ingredients	*Grams*	*Ounces* (approximate)	*Spoons, cups, or handy/local measures*
Dry soya beans	250	8½	
Simsim (sesame) or groundnut paste[1] (or mixture of these)	180	6	
Salt to taste			

[1] To make simsim paste, roast the simsim for 10 minutes over a medium fire and grind or pound. Groundnut paste is made in the same way. The skins are removed after roasting.

Preparation

1. Grind soya beans roughly on a stone and winnow off the skin.
2. Add the beans to boiling water.
3. Cook until the soya beans are soft, stirring from time to time, and adding water as necessary to make a thick porridge consistency. Cooking time for safety, about 2¼ hours.
4. Mix in the simsim/groundnut paste and simmer for 10 minutes.
5. Eat while warm.

Roast soya beans

Ingredients	*Grams*	*Ounces* (approximate)	*Spoons, cups, or handy/local measures*
Soya beans	500	17	
Salt	15	½	
Water	60	2	

Preparation

1. Put the soya beans, salt and water into a metal pan.
2. Roast over a moderate fire, stirring until beans are golden brown and crisp and the water has evaporated. Cooking time for safety, 35 minutes for 500 g.
3. Cool and use as for roasted groundnuts, as a snack.

Note: Time varies with the quantities of beans and water, the heat, and the kind of pan. If 500 g are roasted in a wide shallow pan so that they touch the bottom, 20 minutes are enough to evaporate the water and cook the beans to a golden brown colour.

When all the foods are cooked, the participants complete the calculations and discussion as described on pp. 142–143.

Male and female students can learn to make nutritious dishes from pulses

7.19 Preparation and use of simsim (bungu/sesame/benniseed) baby-mix food (Origin: Sierra Leone)

The participants, together, should prepare the mix beforehand. During this practical class each small group of participants prepares some of the following dishes.

Ingredients for the mix

5 cups parboiled rice
5 cups simsim (bungu/sesame/benniseed)
3 cups groundnuts
2 dried herring or bonga fish (or other small dried fish with soft bones could be used)

Preparation

1. Clean and wash the parboiled rice. (Ordinary rice could be used if parboiled rice is not available.)
2. Soak the rice for 15–20 minutes before pounding.
3. Pound the rice.
4. Clean, wash and remove the husks from the simsim (bungu/sesame/benniseed).
5. Parch (dry-roast) the simsim lightly in a pan until the acrid smell disappears.

6. Pound and grind the seeds into a paste.
7. Parch (dry-roast) the groundnuts lightly in a pan, skin, pound and grind into a paste.
8. Pound the dried fish with the bones and sieve it.
9. Pound the rice flour, groundnut paste, simsim paste and pounded dried herrings together into a crumbly flour.
10. Dry the mixture in the sun for about an hour, then store in a tightly closed tin.

Note: Drying time will depend on the strength of the sun.

Uses of simsim baby-mix

Cook as much of the simsim mix into a thick pap as the child will eat in two meals after breast feeding. Begin feeding the simsim pap at any time after the child is 6 months old.

To make the simsim baby-mix pap (very good for babies)

Ingredients

2–3 tablespoons of simsim baby-mix
A few drops of palm oil or a little milk
1½–2 cups water
Pinch of salt

Preparation

1. Break down the powder mix into a smooth thin liquid with a little water.
2. Put this smooth liquid into a pot with the rest of the water.
3. Boil for at least 20 minutes until thick, stirring to prevent lumping or sticking.
4. Add the few drops of palm oil or a little milk and a pinch of salt.
5. Serve to child in a cup using a teaspoon.

Note: If the child is weaned, give the pap with plenty of milk if available. Add 4 tablespoonfuls of boiled milk, or half a small can of evaporated milk; or 5 rounded teaspoonfuls of dried milk powder can be mixed into the porridge.

Steamed pap cakes

Ingredients

Left-over vegetables (use immediately; do not keep overnight)
Seasonings (no pepper)

Simsim baby-mix pap (left-over) (use immediately; do not keep overnight)

Preparation

1. Mix the seasonings and left-over vegetables with the simsim baby mix pap.
2. Place in a banana leaf with chopped hard cooked egg or fish cooked, flaked, without skin or bones.
3. Fold and seal the leaf; steam the package for 20 minutes.
4. Serve warm or cold.

The mixture can also be steamed in a small enamel bowl with a paper or leaf tied over it as a cover, or in a small aluminium food box with a lid.

Fried cakes

Ingredients

½ cup simsim baby-mix
½ cup rice flour
1 cup water
1 egg
Seasoning (no pepper)
Fat for frying

Preparation

1. Mix the ingredients and fry small spoonfuls of the mix in deep fat until golden.
2. Serve warm or cold to the child, using a teaspoon.

Note: Production of foods of this kind to sell in the community could be a home industry for a group of village women or for individual women. Village cooked-food sellers are common in many African countries.

When all the foods are cooked, the participants complete the calculations and discussion as described on pp. 142–143.

7.20 Traditional weaning foods

Objective

To preserve traditional weaning foods of good nutritional value which would be easily acceptable in the present time.

Note: In many countries previous generations have had good traditional diets which are being lost with the move to a money economy and the introduction of manufactured food products. Sometimes it is possible to revive good old recipes or food practices before they are forgotten. If the

participants at a workshop are in an area of the country where they can consult with the people in their home community, or the community(ies) in which they work, or with the people of communities they know very well, then the following practical experience may prove very useful.

Procedure

(a) The participants ask the oldest people in their communities how children were weaned and toddlers fed 60–70 years ago (2 or 3 generations ago) when they were young.
(b) Each participant selects the best recipes which she or he finds from the enquiry and prepares them for the class to taste and to discuss in terms of nutritive value and cost.
(c) If this enquiry produces a few good recipes or mixtures of foods or methods of food preparation, the workshop can prepare a small recipe leaflet for use in the country. Sometimes it is easier to get people to accept traditional recipes from the past than new ones, as an appeal can be made to their national or local pride.

Sometimes good weaning dishes which have been forgotten can be revived

7.21 Acceptability tests

Objective

That participants try out a method of testing the acceptability of new foods or dishes for use with any group but especially with illiterate groups who cannot fill up forms.

Note: The following is a good method for a simple acceptability test which can be used with people who are illiterate as well as with literates. It can be used to test the high-protein/high-calorie foods prepared in the exercises above, or, indeed, to test the acceptability of anything.

Procedure

(a) One or two participants obtain a supply of dried beans (or cow peas) in 3 colours, in a box, tin or plate (more of each colour than the number of people in the audience).

(b) They prepare 3 large coloured cardboard or paper cut-outs, each the shape of a bean. These are painted in 3 different colours (unless the paper is coloured correctly) to match the beans in the box.
- The black bean means 'like the food being tested very much'.
- The red bean means 'neither like nor dislike' or 'not sure'.
- The yellow bean means 'don't like' the food being tested.

(c) They draw faces on the beans to represent 'like', 'not sure' and 'don't like', to remind the people tasting the food of what the different coloured beans mean.

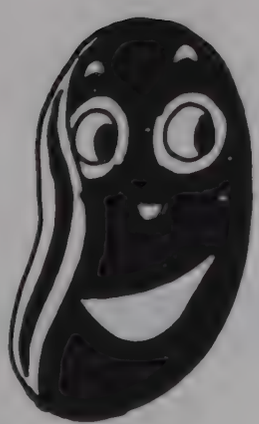
(d) They have a bag or non-transparent bottle or jar or tin ready.

(e) They explain to the people present that each person will taste the food and will then vote on whether they like it, are not sure if they like it, or do not like it, by choosing the correct colour of bean from the box and dropping it secretly in the bag or jar.

(f) The food to be tested is passed round the audience (the class or a group of parents or school children, for example) and everyone is invited to try it.

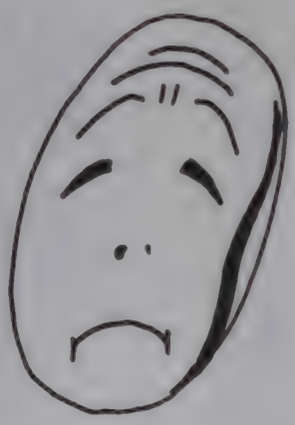
(g) After each member of the test group has tasted the food, the box of beans is passed round, together with the bag or non-transparent jar or tin. Each member in turn secretly selects a bean of the colour he or she wants to vote and pops it in the bag or jar without anyone seeing, so that all votes are secret.

(h) The beans are sorted by colour and each colour counted to find out how many and what percentage of the tasting group liked or did not like the food, or was not sure about it. This gives a good idea of its acceptability in the participating group.



Black bean
like

Red bean
not sure



Yellow bean
don't like

APPENDIX 1

Daily requirements of energy and nutrients according to FAO/WHO

	Calories[4] (kcal)	*Protein*[5] (g)	*Calcium*[6] (mg)	*Iron*[7,9] (mg)	*Retinol*[8] (*Vitamin A*) (µg)	*Thiamine*[8] (mg)	*Riboflavin*[8] (mg)	*Niacin*[8] (mg)	*Ascorbic acid*[7] (mg)
Infants									
Age (months)									
0–3	120/kgBW	2.40/kgBW	500– 600[1]	[2]	[2]	[2]	[2]	[2]	[2]
4–6	115/kgBW	1.85/kgBW	500– 600[1]	[2]	[2]	[2]	[2]	[2]	[2]
7–9	110/kgBW	2.03/kgBW	500– 600	10	300	0.4	0.6	6.6	20.0
10–12	105/kgBW	1.80/kgBW	500– 600	10	300	0.4	0.6	6.6	20.0
Children									
Age (years)									
1	1180	27.0	400– 500	10	250	0.5	0.7	7.8	20.0
2	1360	27.0	400– 500	10	250	0.5	0.8	9.0	20.0
3	1540	27.0	400– 500	10	250	0.6	1.0	10.3	20.0
4–6	1830	34.0	400– 500	10	300	0.7	1.1	12.1	20.0
7–9	2190	41.0	600– 700	10	400	0.8	1.3	14.5	20.0
Males									
10–12	2600	50.0	600– 700	10	575	1.0	1.6	17.2	20.0
13–15	2900	62.0	600– 700	18	725	1.2	1.8	19.1	30.0
16–19	3070	63.0	500– 600	9	750	1.2	1.9	20.2	30.0
20–29[10]	3000	62.0	400– 500	9	750	1.2	1.8	19.8	30.0
30–39[10]	3000	62.0	400– 500	9	750	1.2	1.8	19.8	30.0
40–49	2850	62.0	400– 500	9	750	1.1	1.7	18.8	30.0
50–59	2700	62.0	400– 500	9	750	1.1	1.7	17.9	30.0
60–69	2400	62.0	400– 500	9	750	1.0	1.5	15.8	30.0
70 +	2100	62.0	400– 500	9	750	0.8	1.3	13.9	30.0

BW = Body weight

Females									
10–12	2350	48.0	600– 700	10	575	0.9	1.5	15.5	20.0
13–15	2490	52.0	600– 700	24	725	1.0	1.5	16.4	30.0
16–19	2310	50.0	500– 600	28	750	0.9	1.4	15.2	30.0
20–29[11]	2200	48.0	400– 500	28	750	0.9	1.3	14.5	30.0
30–39[11]	2200	48.0	400– 500	28	750	0.9	1.3	14.5	30.0
40–49	2090	48.0	400– 500	28	750	0.9	1.3	13.8	30.0
50–59	1980	48.0	400– 500	9	750	0.8	1.2	13.1	30.0
60–69	1760	48.0	400– 500	9	750	0.7	1.1	11.6	30.0
70+	1540	48.0	400– 500	9	750	0.6	1.0	10.2	30.0
Pregnancy	+300	+15.0	1000–1200	28[3]	750	1.0	1.5	16.5	50.0
Lactation	+550	+28.0	1000–1200	28[3]	1200	1.1	1.7	18.2	50.0

[1] Not breast-fed.
[2] Breast feeding is assumed to be adequate.
[3] If not anaemic, otherwise iron supplements will be required.
[4] Energy requirements: Report of a Joint FAO/WHO Expert Group, Rome, 1972.
[5] Protein requirements calculated from recommendations given by the same expert group. Recommendations for egg/milk protein have been used for ages 1–6 months. From 7–12 months, the expert group's recommendations for egg/milk protein have been converted to mixed proteins, net utilization 80 per cent and from one year onwards to net protein utilization 60 per cent.
[6] Calcium requirements: Report of an FAO/WHO Expert Group, FAO, Rome, 1961.
[7] Requirements of ascorbic acid, vitamin D, vitamin B_{12}, folate and iron; Report of a Joint FAO/WHO Expert Group, FAO, Rome, 1970.
[8] Requirements of vitamin A, thiamine, riboflavin and niacin: Report of a Joint FAO/WHO Expert Group, FAO, Rome, 1965.
[9] Requirements decrease with increase in intake of animal foods.
[10] Reference man, 20–39 years old weighing 65 kg.
[11] Reference woman, 20–39 years old weighing 55 kg.

APPENDIX 2

Composition of foods per 100 grams edible portion

Item No.	Food and Description	Water (%)	Calories (kcals)	Protein (g)	Carbohydrate (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vit.A, Retinol and Retinol equiv. (µg)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Ascorbic acid (mg)	Refuse in, as purchased (%)
	CEREALS													
1.	Maize-meal sifted	12.2	368	9.4	74.1	3.3	18	3.3	0	0.26	0.08	1.0	0	0
2.	Maize-meal whole	12.2	353	9.3	73.4	3.8	17	4.2	4	0.30	0.08	1.8	3	0
3.	Maize starch	13.2	360	4.5	81.1	0.8	10	4.0	0	0	0	0	0	0
4.	*Maize whole grain	11.0	359	9.3	73.7	4.4	12	3.8	7	0.34	0.10	1.8	3	0
5.	Bullrush millet Roasted 75% Extraction flour	16.0	333	5.9	71.8	3.5	17	39.0	0	0.18	0.22	0	0	0
6.	Finger-millet meal	12.8	336	5.6	76.8	1.4	316	54.5	0	0.22	0.10	0.8	0	0
7.	Rice parboiled, milled	11.8	364	7.0	79.8	0.6	6	2.4	0	0.17	0.03	5.4	0	0
8.	Rice polished	12.0	363	7.0	79.9	0.5	9	1.7	0	0.10	0.03	2.8	0	0
9.	Wheat flour (brown)	11.9	351	10.5	74.7	2.0	36	3.6	0	0.37	0.08	2.8	0	0
10.	Wheat flour (white 72% extraction)	12.1	364	10.3	76.2	1.0	27	2.2	0	0.08	0.05	0.8	0	0
11.	Wheat bread (brown)	38.1	233	7.7	50.8	1.6	43	2.2	0	0.20	0.08	2.1	0	0
12.	Wheat bread (white)	36.9	261	7.7	51.7	2.0	37	1.7	0	0.16	0.06	1.0	0	0
13.	Wheat biscuits (imported)	6.5	376	12.9	77.0	1.1	0	0	—	—	—	—	—	—
14.	Wheat macaroni (dried)	8.4	379	11.8	77.8	1.3	23	1.5	—	—	—	—	—	—
15.	Sorghum meal (unsifted or home pounded)	10.8	343	9.5	75.5	2.8	28	10.0	0	0.28	0.09	3.4	0	0
16.	Teff meal (white)	10.3	371	9.8	75.1	2.6	129	21.6	0	0.3	0.12	1.8	0	0
17.	Ingera (from teff)	63.3	136	4.4	29.8	0.9	58	29.1	0	0.10	0.08	1.2	0	0
	STARCHY ROOTS, TUBERS AND FRUITS													
18.	Banana (ripe)	77.0	88	1.5	20.6	0.1	9	1.4	0	0.03	0.03	6.0	9	32
19.	Cassava (common bitter, dried)	9.4	355	2.1	85.4	0.6	102	0.7	0	0.12	0.02	1.5	1	0
20.	Cassava (sweet, dried[1])	8.7	357	1.3	86.6	0.5	121	—	—	—	—	—	—	0

21. Cassava (bitter, meal)	13.0	344	1.6	83.2	0.5	66	3.6	0	0.06	0.05	0.9	4	0
22. Cassava meal (fermented and dried) (Gari)	12.6	351	1.0	84.2	1.1	45	1.6	0	0.08	0.03	1.0	0	0
23. Cassava (bitter, soaked dried and pounded) (Lafun)	14.8	337	1.1	82.2	0.3	315	5.3	0	0.04	0.03	1.0	0	0
24. Cassava (bitter root, raw)	62.0	149	1.2	35.7	0.2	68	1.9	5	0.04	0.05	0.6	31	26
25. Ensete (Kocho) (false banana)	56.3	171	1.2	41.3	0.2	120	5.3	0	0.03	0.04	0.1	0	0
26. Plantain (ripe)	65.4	135	1.2	32.1	0.3	8	1.3	130	0.08	0.04	0.6	20	34
27. Potato (Irish)	77.7	82	1.7	18.9	0.1	13	1.1	4	0.07	0.03	1.3	21	14
28. Potato (Sweet, pale variety)	68.8	121	1.6	28.5	0.2	33	2.0	12	0.09	0.04	0.7	37	21
29. Taro (Coco Yam)	73.1	102	1.8	23.8	0.1	51	1.2	0	0.10	0.03	0.8	8	16
30. *Yam flour	14.0	335	3.4	80.0	0.4	20	1.1	0	0.10	0.08	1.1	0	0
31. *Yam (fresh)	69.0	119	1.9	27.8	0.2	52	0.8	2	0.11	0.02	0.3	6	16
PULSES													
31. Bambara Nuts (dried)	10.3	367	18.8	61.3	6.2	62	12.2	2	0.47	0.14	1.8	0	25
32. Broad Beans (whole)	10.1	344	26.2	59.4	1.3	104	6.7	22	0.38	0.24	2.1	16	54
33. Chick Pea (whole)	10.0	357	19.6	63.5	3.7	252	11.1	10	0.48	0.16	1.8	0	0
34. Cow Pea (whole, dried)	10.8	342	23.1	61.4	1.4	101	7.6	12	0.75	0.18	2.5	1	0
35. Garden and Field Pea (dried)	11.0	339	22.3	62.0	1.1	90	17.9	2	0.88	0.17	3.0	0	0
36. Grams (Mixed) (Mung Beans, etc.)	9.8	341	23.5	61.8	0.9	102	8.9	21	0.52	0.20	2.4	0	0
37. Groundnuts (shelled, dry)	6.5	549	23.2	23.0	44.8	49	3.8	3	0.79	0.14	15.5	1	0
38. Groundnuts (shelled roasted)	1.8	595	23.2	21.7	50.9	42	3.8	3	0.45	0.11	15.3	0	0
39. Kidney Haricot Bean (dried)	12.3	336	21.7	60.9	1.5	120	8.2	2	0.37	0.16	2.4	1	0
40. Lima Bean (dried)	12.7	335	21.4	61.1	1.4	116	4.9	—	0.33	0.16	2.1	1	0
41. Pigeon Pea (dried, whole)	9.9	345	19.5	65.5	1.3	161	15.0	9	0.72	0.14	2.9	0	0
42. Soya Bean (mature, whole)	9.5	405	33.7	33.9	17.9	183	6.1	9	0.71	0.25	2.0	0	0
43. Soya Bean (meal or whole ground dried seeds)	9.1	398	33.7	36.9	15.7	249	6.0	9	0.55	0.25	2.0	0	0
SEEDS AND NUTS													
44. Cashew Nut (dried)	7.6	542	17.4	29.2	43.4	76	18.0	0	0.65	0.25	1.6	7	0

Item No.	Food and Description	Water (%)	Calories (kcals)	Protein (g)	Carbohydrate (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vit.A, Retinol and Retinol equiv. (µg)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Ascorbic acid (mg)	Refuse in, as purchased (%)
45.	Coconut (kernel, mature kernel)	42.6	388	3.6	13.8	39.0	21	2.5	4	0.03	0.03	0.6	2	35
46.	Pumpkin Seed, (squash seeds dried without shell)	5.5	555	23.4	21.5	46.2	57	2.8	5*	0.15*	0.20*	1.4	2*	25*
47.	Sesame Seed (Simsim Benniseed) (whole, dried)	5.2	558	17.9	22.3	48.4	816	8.1	5	0.68	0.19	3.4	0	0
48.	Sunflower seed (dried)	5.5	486	13.0	27.7	51.3	100*	7.0*	0	1.9*	0.20*	5.8*	0	50*
49.	Water Melon Seed (Egusi) (dried, shelled)	5.7	567	25.8	15.1	49.7	53	7.4	0	0.10	0.12	1.4	0	0
	VEGETABLES													
50.	Beans, Broad (fresh, shelled)	76.3	75	7.1	15.3	0.4	38	1.4*	15*	0.10	0.22	1.5*	140	55*
51.	Beans (immature, whole pod)	88.7	36	2.5	7.9	0.2	43	1.4	125	0.08	0.12	0.5	27	8
52.	Cabbage	91.4	26	1.7	6.0	0.1	47	0.7	17	0.04	0.04	0.3	54	37
53.	Carrot	86.6	40	0.9	9.6	0.1	35	0.7	913	0.04	0.04	0.6	8	26
54.	Cassava leaves	71.7	91	7.0	18.3	1.0	303	7.6	1963	0.25	0.60	2.4	311	20*
55.	Cauliflower	91.6	25	2.0	5.4	0.1	35	1.2	2	0.06	0.09	0.5	96	44
56.	Eggplant (garden egg)	90.5	32	1.0	7.7	0.2	14	1.3	6	0.05	0.05	0.5	9	22
57.	Kale leaves	84.6	43	3.5	7.7	0.8	132	1.3	150	0.05*	0.42*	1.2*	110	32
58.	Leeks	85.9	46	1.5	11.3	0.2	55	1.7	3*	0.08*	0.06*	0.3*	11	20*
59.	Lettuce	93.7	20	1.2	4.3	0.2	26	0.7	30*	0.10*	0.10*	0.4*	10*	30*
60.	Maize (fresh cob)	57.8	152	5.0	34.4	2.1	18	1.8	0	0.16	0.08	1.3	10	30
61.	Okra	88.6	36	2.1	8.2	0.2	84	1.2	31	0.04	0.08	0.6	47	19
62.	Onion (mature)	88.5	41	1.2	9.6	0.1	27	0.8	0	0.02	0.04	0.2	11	6
63.	Pepper, Sweet	86.1	48	2.0	10.3	0.8	29	2.6	30	0.12	0.15	2.2	140	16*
64.	Pepper, Chile	87.4	42	1.1	10.7	0.1	5	1.2	55	0.04	0.05	2.0	40	0
65.	Pumpkin, Yellow	92.6	23	1.0	5.5	0.1	25	1.4	594	0.05	0.02	0.5	8	23
66.	Pumpkin leaves	89.2	27	4.0	4.4	0.2	477	0.8	600	0.08*	0.06	0.3	80	20*
67.	Spinach (*Amaranthus*)	84.0	42	4.6	8.3	0.2	410	8.9	953	0.05	0.42	1.2	64	24
68.	Sweet Potato leaves	83.0	49	4.6	10.2	0.2	158	6.2	978	0.10	0.28	0.9	70	20*
69.	Tomato	93.5	21	1.0	4.8	0.2	10	0.6	75	0.06	0.04	0.6	26	4
70.	*Wild dark green leaves taken as dark green, high carotene	94.0	42	4.6	8.3	0.2	410	8.4	953	0.05	0.42	1.2	64	24

FRUITS													
71. Apple	84.0	58	0.2	15.1	0.4	3	0.2	13	0.04*	0.02*	0.2*	1*	16*
72 Avocado Pears	80.3	121	1.4	6.1	11.3	19	1.4	88	0.05	0.15	2.0	18	50
73. Dates (dried)	17.2	293	2.7	77.6	0.6	82	9.4	5	0.06	0.15	1.8	0*	13*
74. Figs (fresh)	85.2	52	0.8	13.2	0.2	44	0.5	5	0.05*	0.05*	0.4*	15	14
75. Grapefruit (fruit pulp)	90.0	34	0.8	8.6	0.1	21	0.6	4	0.05	0.03	0.2	44	49
76. Guava	82.2	64	1.1	15.7	0.4	24	1.3	48	0.06	0.04	1.3	326	19
77. Lemon	89.8	29	0.7	8.8	0.4	25	0.5	2*	0.03*	0.02	0.3*	45*	36
78. Lime	89.5	32	0.6	8.7	0.8	19	0.7	2	0.03	0.02	0.3	45	41
79. Mango	82.9	60	0.6	15.8	0.2	24	1.2	533	0.03	0.05	0.4	42	36
80. Melon/Cantaloupe (musk)	94.8	18	0.5	4.2	0.1	20	1.7	5	0.04	0.02	0.6	12	20*
81. Orange	88.0	43	0.6	10.5	0.4	28	0.1	12	0.02	0.03	0.2	46	30*
82. Passion Fruit	79.0	92	2.3*	16.0*	2.0*	25	1.0*	2*	0.03	0.10	1.5*	20*	43*
83. Pawpaw (papaya)	90.8	32	0.4	8.3	0.1	21	0.6	159	0.03	0.03	0.4	52	26
84. Pineapple	86.9	47	0.4	12.4	0.1	16	0.4	15	0.06	0.03	0.1	34	33
85. Water Melon	93.6	22	0.5	5.5	0.1	8	0.3	42	0.04	0.05	0.1	8	45
SUGAR													
85. Honey	19.2	311	0.4	80.1	0	11	0.6	0*	0*	0.05*	0.2*	0*	0
86. *Jam	29.0	260	0.4	69.0	0	12	0.3	0	0	0	0	10	0
87. *Sugarcane juice	81.0	73	0.3	18.0	0	6	2.0	0	0.02	0.02	0.1	0	0
88. *Sugar (brown)	7.6	344	0.2	86	0	30	2.0	0	0.02	0.1	0.3	0	0
89. *Sugar (white)	0	400	0	100	0	0	0	0	0	0	0	0	0
MEATS, POULTRY, INSECTS													
90. Beef (very lean, boneless)	74.6	122	20.6	0	3.8	22	4.6	0	0.06*	0.17	3.2	0	0
91. Camel[2]	59.1	267	19.6	0	20.3	10	2.0	10	0.15*	0.20*	3.1	0*	20*
92. Game[3]	60.2	150	30.4	0	2.2	65	2.1	0	0.07	0.28	7.8	0	—
93. *Goat	73.0	145	16.0	0	9.0	11	2.5	0	0.20	0.35	5.0	0	26
94. Grasshoppers (fresh)[4]	62.7	170	26.8	5.5	3.8	40	11.0	—	—	0.50*	2.2*	—	—
95. Heart, beef	77 0	109	16.8	1.3	3.6	9	4.8	56*	0.60*	0.90*	7.0*	0*	0*
96. *Kidney, beef	75.0	127	16.0	0	7.0	10	10.0	280	0.30	2.00	7.0	12	0
97. Liver, beef	70.0	143	19.0	5.0	4.7	8	10.0	840	0.30*	2.50*	5.2	71	0*
98. Mutton	60.7	265	16.9	0	21.4	10	2.0	10	0.15*	0.20*	3.1	0*	20*
99. Pork, medium fat	46.1	418	12.4	0	40.5	11	1.8	0	0.80*	0.20*	4.0*	0*	18*
100. *Poultry	73.0	139	19.0	0	7.0	15	1.5	—	0.10	1.15	9.0	0	33
101. *Snail (river, pond)	78.0	82	12.0	4	2.0	1500	8.0	—	—	0.05	1.3	—	53
102. Termites (dried)	1.7	656	35.7	3.5	54.3	142	52.0	—	0.03	5.97	5.8	0	0
103. Termites (fresh)	44.5	356	20.4	4.2	28.0	12*	1.0*	—	—	—	—	—	0
104. Tongue, beef (medium fat)[5]	68.0	207	16.4	0	15.0	8	2.1	—	0.05	0.29	3.5	—	—
105. Tripe[5]	79.1	100	19.1	0	2.0	127	1.6	—	—	0.15	1.6	—	—

Item No.	Food and Description	Water (%)	Calories (kcals)	Protein (g)	Carbohydrate (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vit.A, Retinol and Retinol equiv. (μg)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Ascorbic Acid (mg)	Refuse in, as purchased (%)
	FISH													
	Average all kinds of fish:													
106.	raw fillet	74.6	119	21.6	0	3	32	1.7	—	0.05	0.08	2.8	0	48
107.	whole, fresh	73.7	103	18.8	0	2.5	794	2.3	—	0.05	0.10	3.0	0	0
108.	dried, salted whole	13.8	269	47.3	0	7.4	1018	4.9	—	0.07	0.33	6.2	0	—
	DAIRY PRODUCTS													
109.	Milk (cow, whole fresh)	85.2	79	3.8	5.4	4.8	143	0.1*	108	0.04*	0.30	0.1*	1	0
110.	*Milk (cow, whole dried)	4.0	500	25.5	37.5	27.5	900	0.8	288	0.30	1.15	0.8	13	0
111.	Milk (cow, skimmed fresh)	90.5	39	3.5	4.4	0.8	120*	0.1*	0	0.05*	0.55	0.1*	1*	0
112.	Milk (cow, skimmed dried)	4.7	353	28.9	58.5	0.4	1265	1.0*	—	0.40	1.53*	0.8	0	0
113.	*Milk (cow, whole evaporated)	74.0	140	7.0	10.0	8.0	260	0.2	77	0.06	0.32	0.21	2	0
114.	*Milk (cow, whole, sweetened condensed)	29.0	317	7.3	53.9	8.0	270	0.2	84	0.09	0.33	0.2	2	0
115.	Milk (human, fresh)	86.5	67	1.1	9.1	3.1	32	0.2	48	0.02	0.04	0.2	4	0
116.	Milk (camel, fresh)[6]	88.5	63	2.0	4.7	4.1	94	—	—	—	—	—	—	—
117.	Milk (goat, fresh)	83.9	85	3.4	7.0	4.9	130*	0.1*	36*	0.05*	0.10*	0.3*	1	0
118.	Milk (sheep, fresh)	82.8	100	5.9	3.5	7.0	200*	0.1*	56*	0.07*	0.50*	0.5*	2*	0
119.	*Cheese (whole, cow-milk, hard)	39.0	384	24.0	0	32.0	800	0.5	332	0.04	0.50	0.1	0	0
120.	*Cheese (skimmed milk, soft)	77.0	87	19.5	1.0	0.5	90	0.4	3	0.02	0.30	0.1	0	0*
121.	Eggs (hens, raw)	77.0	140	11.8	0	9.6	45	2.6	400	0.12*	0.35*	0.3	0*	12*
	FATS AND OILS													
122.	Butter (from cow's milk)	21.0	685	0	1.5	77.3	15*	0.2*	640	0	0	0	0	0
123.	*Margarine	14.0	765	0	0	85.0	4	0	300[6]	0	0	0	0	0
124.	*Cooking fat (animal)	0	900	0	0	100	0	0	0	0	0	0	0	0
125.	Ghee (from butter)	1.4	862	0	0.6	97.8	0	0.4	480*	0	0	0	0	0
126.	*Oils (vegetable)	0	900	0	0	100	0	0	0	0	0	0	0	0
127.	*Red Palm Oil	0	900	0	0	100	0	0	2000	0	0	0	0	0
128.	Beer Sorghum (Kaffir) (2.1% alcohol by weight strained)	93.6	31	0.5	3.6	0	1	0.6	0	0.4	0.5	0.4	0	0

[1] No figures for raw sweet cassava are available.
[2] Vitamins and minerals of camel taken from mutton which it resembles in protein and fat content and energy value.
[3] Taken as antelope, salted fresh.
[4] Vitamin content taken as locust.
[5] Taken from *Composition of Foods*, Agriculture Handbook No 8. Agricultural Research Service, US Department of Agriculture, Washington DC, 1963.
[6] If fortified.

Notes

1. Most values are from *Food Composition Table for use in Africa*, US Department of Health, Education, and Welfare, Washington. FAO, Rome, 1968. Where no analyses are available in the African table, values have been taken from *Human Nutrition in Tropical Africa*, M. C. Latham, FAO, Food and Nutrition Series, No. 11, Rev. l, Rome, 1979. These are marked with *.
2. Micrograms β-carotene have been divided by 6 to obtain retinol equivalent weights. The retinol figures include the β-carotene figures converted.
   Figures from *Human Nutrition in Tropical Africa* have been converted as follows:
   - IU vitamin A from animal sources have been multiplied by 0.3 to obtain retinol equivalent.
   - IU vitamin A from vegetable sources have been multiplied by 0.6 to obtain micrograms β-carotene and divided by 6 to obtain retinol equivalent.
3. A dash (—) means no figures are available. A 0 means that food contains none.

APPENDIX 3

Useful additional reading

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20. WHO (1980) *The Primary Health Worker: Working Guide for Training*, WHO, Geneva
21. WHO, (1981) *Contemporary Patterns of Breast Feeding: Report on the WHO Collaborative Study on Breast Feeding*, WHO, Geneva
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Jean A. S. Ritchie, M.Sc., D. Diet., Dip. Ed., is a nutritionist who has worked throughout the tropics to establish effective nutritional programmes and education about nutrition. She was the Food and Agriculture Organisation's (FAO) Regional Adviser at the United Nations Economic Commission for Africa, working in the FAO's Programmes for Better Family Living and the African Training and Research Centre for Women.

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ISBN 0-333-35767-1

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